

## 2. MAMMALS

by

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With 7 plates.

The knowledge about the mammalian fauna of Africa has taken great strides during the last years. The old opinion that there was only one species of each mammalian type, so to say, for instance, one species of african elephant, one kind of giraffe, one species of spotted hyæna etc. is now a thing of the past, although it was the prevailing opinion about 20 years ago, or less. It is now generally acknowledged that within the different geographical districts of Africa different forms of mammals have been developed. This great change of opinion could only be based on and proved by a great material such as has been collected in the later years especially in the museums of Berlin and of London. The keepers of the mammalian departments of these museums Professor P. MATSCHIE and Dr OLDFIELD THOMAS have also succeeded together with their fellow workers and scholars to bring about the great change of opinion concerning the mammalian fauna of Africa. But it is quite clear that in so few years it could not be possible to obtain sufficient material from all parts of this vast continent to elucidate all different questions. There are thus still great gaps in our knowledge which must be gradually filled. These gaps are the greater as the works of earlier authors cannot give full information about the mammals described in them, if the type specimens are not kept; or proper regard cannot be taken to them, because the species of former days was often, if not always, a collective idea according to our present comprehension. The difficulty of understanding earlier works without accession to the types is increased by the fact that some mammals have developed a great many different forms so that almost every little geographical district is provided with its own typical race of the same. Others are less variable and have, as it seems, only developed a few different races each with a great area of distribution, or, finally, is a »species» in the old meaning in one part of the continent split up in many different races and in another more constant over a great area. To give a list or a synopsis of the mammals of a certain district of Africa is thus only possible in such a case as when its fauna has been fully studied during the last years, and is completely known. This is not the case with the Kilimandjaro-Meru district and I must therefore refrain from doing more than classifying and dis-

ecussing the forms represented in the rich material [80 sp. (3 n. sp., 3—4 n. subsp.): 417 specimens] which has been brought home by Professor YNGVE SJÖSTEDT from his expedition to these parts of East Africa. It is the more impossible to give a full synopsis of the mammals occurring in the Kilimandjaro-Meru district as it appears very probable, and may to some extent be proved on the following pages, that at this territory several different faunas meet. At least a northern and a southern, but perhaps also a western.

In some instances in the following only binomials are used, although most probably the animal in question ought to have been regarded as a subspecies of another existing form, but with our present knowledge it has been impossible to decide which. This has made some inconsequence in the naming necessary.

Professor SJÖSTEDT has in many instances kindly given me notes about the habits etc. of some animals and for this as well as for his kindness in trusting me with this work I beg to express my best thanks. I wish also to express my gratitude to my friends Prof. P. MATSCHIE and Dr. OLDFIELD THOMAS who kindly have given me their advice in some critical instances as will be mentioned below.

## Primates.

### *Colobus caudatus* THOMAS.

*Colobus caudatus* THOMAS, Proc. Zool. Soc. 1885 p. 219.

*Kilimandjaro*: 1 ♂ and 1 ♀ from the rain forest Kibonoto, *Kilimandjaro* 2,000 m. above the sea <sup>3</sup>/<sub>7</sub> 1905—1 ♂ the same locality <sup>1</sup>/<sub>8</sub> 1905—5 specimens the same locality <sup>30-31</sup>/<sub>8</sub> 1905—1 ♀ specimen from the same locality Nov. 1905—1 small young June 1905.

The youngs are to begin with almost entirely white, as has been observed already by SCHILLINGS. As a white colouration cannot be regarded ancestral or original in the *Guerezas*, the white of the young must be explained as aquired, being protective and useful as well when the young is seen against the background of the mother as against the white lichens (*Usnea barbata*) to the long swaying festoons of which the white mantle and long tail of this *Guereza* correspond in a most remarkable manner.

Professor SJÖSTEDT has communicated the following notes from his diary: »In the rain forest. — — — Suddenly the crowns of the trees over our heads become full of life. The branches are deeply weighed down under the leaps of a number of big animals, the foliage rustles and the whole trees appear enlivened. A glimpse directed upwards proves to me that it is flock of *Colobus* monkeys. In their splendid white and black array with the long lateral fringes waving and the long bushy tail floating in the air they throw themselves over to a tree standing near or run in a hurry along the branches only to dash away in daring plunges through the air. Soon the animals become more quiet, and they are not shy. Their peculiar, dull clattering or buzzing noise sounds almost like a spinning wheel, sometimes like the clattering of a stork, at a distance dying away as a monotonous humming noise.»

»When they are resting in the often rather thin crowns of the tall trees, the huntsman is allowed to walk up quite below the tree if he is somewhat cautious. The *Gue-*

rezas then sit squatted on the branches with their tail hanging straight down, often surrounded by swaying *Usnea*-lichens which hang down from the branches in long tufts, they are in spite of their size very difficult to detect and often elude even the sharpest eyesight.»

It is quite interesting to note that SJÖSTEDT found a Mallophagan parasite on these Guerezas, the first of that kind ever recorded from a monkey. It has been described under the name of *Trichodectes scolobi* by KELLOGG (se No. 15:4 of this work).

*Cercopithecus albogularis kibonotensis* n. subsp.

Conf. *Cercopithecus albogularis* SYKES, Pocock Proc. Zool. Soc. London 1907 p. 700.

*Kilimandjaro*: Kibonoto: 1 specimen <sup>13</sup>/<sub>7</sub> 1905 — 1 spec. <sup>15</sup>/<sub>7</sub>, kept tame some time — 1 spec. <sup>18</sup>/<sub>7</sub> 1905 — 2 spec. July 1905 — 1 spec. 1905 — 1 male of unusually great size <sup>2</sup>/<sub>10</sub> 1905 — 2 (adult and young) Nov. 1905 — 2 specimens, Kibonoto.

These specimens agree rather closely with Pocock's description of the typical *Cercopithecus albogularis* but it differs in the following points. Pocock describes the typical *albogularis* as follows: »Head, cheeks, and dorsal area between the shoulders speckled black and grey» — — — In all the specimens from Kilimandjaro the hairs of the head and nape are black and ringed with yellow. In some larger and stronger specimens this yellow might be termed reddish yellow, and in all it is decidedly yellow, not »grey». On the hindneck the rings are paler, more whitish. Shoulders and arms are wholly black in the Kilimandjaro monkeys, except that the inner side of the upper arm is more or less ashy grey, but the forearm is intensely black, not speckled as in the typical *albogularis* according to Pocock. The legs are black, finely speckled with ashy grey. Red hairs at the root of the tail and in the ischiopubic region are found in both sexes and in all ages, but less in the adult male than in the others. Chin and throat white (in younger specimens with soft wavy hairs); on the sides of the neck this white area passes into a broad iron grey speckled collar which, however, leaves a broad dark band on the hind-neck free and with its black hairs sparingly ringed with whitish or pale yellow contrasting against the iron-grey collar. The white of the throat does not extend to the inside of upper arm as in the typical form according to Pocock, and it is rather sharply defined from the dark grey ventral surface. On the back the reddish yellow is quite dominating on the lumbar and sacral regions and from there extending more or less forward, and on the tail, flanks etc.

These differences, although slight, appear to indicate a separate geographic race or subspecies, which I name after the type-locality Kibonoto.

This monkey is according to SJÖSTEDT very common even up in the rain forest. It lives in greater or smaller bands in dense forests, in groups of trees in the farms and similar localities. When caught they remain wild for a long time and are difficult to tame as they keep their angry disposition and are unreliable. They are caught by the Wadshaggas in a kind of baskets densely made of twigs and put in traps by sticks. These were placed on the ground in the farms where the monkeys lived, and made heavy by stones put on them.



*Cercopithecus pygerythrus johnstoni* Pocock.

*Cercopithecus pygerythrus johnstoni* Pocock, Proc. Zool. Soc. London 1907, p. 738.

*Usambara*: 2 specimens (♂, ♀) from Same <sup>23</sup>/<sub>6</sub> — *Kilimandjaro*: 4 specimens from the cultivated zone at Kibonoto resp. <sup>5</sup>/<sub>7</sub>, <sup>15</sup>/<sub>7</sub> and <sup>3</sup>/<sub>10</sub> 1905 — 1 specimen (♂) from Kibonoto Oct. 1905 — 2 specimens from Kibonoto Nov. 1905. — *Meru*: Ngare na nyuki.

The specimens from Same agree with those from Kibonoto. It is hardly possible that there should be one race of *pygerythrus*-monkeys at Moshi (the type-locality of *C. p. johnstoni*) and another at Kibonoto and Same. I have therefore used Pocock's name but must at the same time state that the colour of the specimens before me cannot be termed »washed-out tawny grey» as that of the type-specimens, but it is much richer and more suitably called yellowish brown.

This monkey as well is common on Kilimandjaro but does not extend its distribution higher up than to the cultivated zone. It is however, most common on the low lands, in the forests of acacias with yellow bark, as for instance, at Ngare na nyuki. Professor SJÖSTEDT writes about them: »It is really astonishing how well their colour at some distance agrees with that of the acacias and when they sit motionless close to the trunk with the black face turned towards the spectator the same resembles in the most puzzling way the black marks on the yellow bark designating the places where branches have fallen off. The monkeys seem to know this protecting resemblance and when they have been scared and thrown themselves from tree to tree they stop suddenly and press close to the trunk remaining motionless. The colour of their face which so strongly contrasts with their general colour proves thus in these surroundings to harmonize with the natural conditions where they live.»

*Papio neumanni* MATSCHIE.

*Papio neumanni* MATSCHIE, Sitz. ber. Ges. Naturf. Fr. Berlin 1897 p. 159--161.

*Meru*: 1 skin and skull of a (young but) adult male from Ngare na nyuki, <sup>25</sup>/<sub>11</sub> 1905 — 1 skin and skull of a young animal from the same locality <sup>26</sup>/<sub>11</sub> 1905.

The skull of the former of these in which the last molar is fully developed presents in a most striking manner the characteristics mentioned by MATSCHIE. Its smallness etc. proves fully that it is perfectly distinct from the baboon of Kilimandjaro and Usambara. The length of the male specimen killed <sup>25</sup>/<sub>11</sub> measured from snout to vent was according to SJÖSTEDT 63 cm.

In November 1905 Professor SJÖSTEDT saw very large flocks of baboons counting from 50 to 100 at Ngare na nyuki: »Sometimes as many as could find place had climbed up in some tree rising over the bushes but as soon as they perceived us approaching they disappeared one after the other and finally the whole herd galloped away between the bushes in direction of a distant forest.»

*Papio ibeanus* THOMAS.

*Papio toth ibeanus* THOMAS, Ann. & Mag. Nat. Hist. XI 1893 p. 47.

*Usambara*: 1 skull of an old male near Mtoni <sup>18</sup>/<sub>6</sub> 1905 — *Kilimandjaro*: 1 skull and skin of a young specimen from Kibonoto <sup>16</sup>/<sub>8</sub> 1905.



The measurements of the adult skull agrees very well with THOMAS' original description. The colour of the skin of the second specimen is perhaps more uniformly fawny brownish than the description indicates but this may be a feature characteristic for the youth. More material is, however, needed before it can be definitely decided which name ought to be applied to this baboon, and whether it is the same race which lives in Usambara and at Kibonoto.

»On Kilimandjaro the Baboons were very obnoxious. The natives must continually keep watches in huts built in trees at the farms and plantations to protect the crop against the daring robberies of the Baboons which took place even in the upper parts of the cultivated zone. The mays fields were especially exposed to their predations. In greater or smaller flocks they wandered about in the woods and bushes especially where a rich undergrowth of bushes offered them protection against sudden dangers. Since they once had observed that some danger threatened, it was no use to pursue them. They were always far ahead, and it could only from the barking of the old ones be understood in which direction they fled. Only if they were surprised on more open ground could they be killed in any number (SJÖSTEDT).»

***Galago panganiensis* (MATSCHIE.)**

*Otolemur panganiensis* MATSCHIE, Sitzber. Naturf. Freunde Berlin 1905 p. 278.

*Usambara*: 1 ♂ from Same, <sup>23</sup>/<sub>6</sub> 1905 — *Kilimandjaro*: Kibonoto, from the cultivated zone, 2 specimens <sup>15</sup>/<sub>7</sub>, 1 specimen <sup>1</sup>/<sub>8</sub>, 2 specimens <sup>16</sup>/<sub>8</sub>, 1 specimen <sup>31</sup>/<sub>8</sub> (kept in confinement for some time), 2 specimens October 1905.

All these specimens are very much alike with regard to the colour of the fur and all have the tail dark at the tip, but the specimen numbered 281 in the collection is a little larger than the others having a basicranial length (from foramen magnum to inner base of incisors)<sup>1</sup> measuring 60 mm. The same measurement of the one next in size is 59 mm. but then none of the others measures more than 56.

»The *Galago* was very common on Kilimandjaro at Kibonoto in the cultivated zone and lower parts of the rain forest. It was also found to be very common in the rain forest on Meru at least up to an altitude of 3.500 m. When the sun had disappeared they were soon heard, especially at some times of the year, uttering their sharp chattering screams, at other times, however, they kept more silent. A *Galago* kept in confinement slept the whole day in the darkest corner of the cage and with the head between the forelegs, it was usually good-tempered, but when irritated it tried to bite. If somebody when it was awake, approached suddenly with the hand it jumped back with the round brown-yellow eyes staring at the intruder, the mouth half opened, and the arms stretched out and making defending movements, sometimes as if it would strike. It liked to eat ripe bananas and greedily cut out large pieces of the same, stretching out the long tongue it licked the soft and sweet fruit pulp, evidently enjoying itself, and growled if disturbed (SJÖSTEDT).»

»The *Galagos* are very stationary. Night after night they were heard from the same groups of trees.»

<sup>1</sup> Otherwise in this paper the basicranial length is counted to the tip of the premaxillaries.

## Chiroptera.

### *Epomophorus minor* DOBSON.

*Epomophorus minor* DOBSON. MATSCHIE, Die Megachiroptera, Berlin 1899, p. 51.  
*Usambara*: A dry specimen from Moembe <sup>17</sup>/<sub>6</sub> 1906.

MATSCHIE reports this species only from the zoogeographical district which he calls Malagarasi, that is the land drained to Tanganyika from the east and north and to Nyansa from the south. Moembe lies, however, outside this district and might be counted to the coast district according to MATSCHIE's divisions.

### *Epomophorus neumanni* MATSCHIE.

*Epomophorus neumanni* MATSCHIE, Die Megachiroptera, Berlin 1899, p. 50.  
*Kilimandjaro*: 1 specimen (♀) <sup>9</sup>/<sub>9</sub> 1905, Ngare nairobi near Kibonoto.

### *Rousettus leachi* A. SMITH.

(= *Rousettus collaris* auct.).

*Xantharpyia collaris* (ILLIGER). MATSCHIE, Die Megachiroptera, Berlin 1899, p. 66. *Rousettus Leachi* A. SM. ANDERSEN, Ann. & Mag. Nat. Hist. Ser. 7 Vol. XIX p. 506.

*Usambara*: 9 specimens from Tanga <sup>4</sup>/<sub>5</sub> 1905», all of them rather young.

This species inhabits in great number the Mkulumusi caves. SJÖSTEDT writes about his visit to these caves: »The road passed down a slope among cocoa palms and high grass, the trees became more dense and formed a vault over our heads near the steep rocks. The air was hot and damp. Turning round a part of the high vertical wall of rock just above the riverbank we stood suddenly before a high and wide entrance to the cave. We lit our carbid torches and entered. Hardly had our voices reechoed in the dark vaults before a strange sight was made visible in the sharp flickering light of the torches. The whole air resounded with the whizzing of hundreds or perhaps thousands of large bats and the roof in the high and long, dome-shaped although narrow vaults was like a continuous undulating dark mass. Armed with a long soft branch with which I struck back and forth among the swarming bats I entered accompanied by the torch-bearer. Now and then a thud was heard and a bat hit by the branch fell down on the muddy floor where we, sinking down to the ankles, catch our prey and hand it to the negro carriers.»

»The smaller insectivorous bats (*Colēura*, *Trīenops*, *Vespertilio*) lived in narrower separate caves where they literally swarmed.»

### *Rousettus lanosus* THOMAS.

*Rousettus lanosus* THOMAS, Ann. & Mag. Nat. Hist. Ser. 7. Vol. XVIII p. 137.  
*Kilimandjaro*: 1 specimen from the cultivated zone at Kibonoto <sup>21</sup>/<sub>7</sub> 1905.

This species was first discovered on Ruvenzori at an altitude of 5,000—13,000 feet. It is easily recognized from the foregoing species by its longer and denser fur, and narrow molars.

*Rousettus sjöstedti* n. sp.

*Usambara*: 1 specimen from the Mkulumusi caves near Tanga, <sup>4</sup>/<sub>5</sub> 1905.

Resembling *R. angolensis* (BOCAGE). Fur woolly, greyish brown above, rather pale brownish grey beneath, a little lighter on the neck and this light colour extends up on the sides of the neck so as to form a collar which is narrowed and almost interrupted on the back. Head coloured like back, darker on snout and on both eyelids. Wing-membrane blackish speckled with light spots. Not quite half the forearm is hairy. Tibia naked. On the lower side the forearm is woolly in a similar degree as above but the wing-membrane is sparsely beset with woolly hairs between humerus and forearm and along the outer side of the latter. Tibia almost wholly naked below. Interfemoral membrane above and below with some very few scattered hairs. Wing-membrane rising from back of second toe but at the end curving to the interspace between first and second.

Palatal elevations six in number, three anterior complete, and three posterior mesially interrupted (in addition to these there is a rudiment of a fourth interrupted fold on one side between the last and next last). Behind these there is an angular serrated fold on the back of the palate.

	Dimensions of <i>R. sjöstedti</i> (in spirit)	Dimensions of <i>R. angolensis</i> (according to BOCAGE)	
	♀ mm.	♂ mm.	♀ mm.
Length of head and body . . . .	125	120	140
"    tail . . . . .	17	13	13
"    head . . . . .	43	45	48
Distance from eye to nostril . . .	16	15	15
Length of ear . . . . .	25	23	22
Forearm . . . . .	86	80	79
Thumb . . . . .	34, <sup>5</sup>	32	33
Metacarpus of third finger . . .	59	56	60
First phalanx of third finger . . .	38 (39)	40	40
Second " " " " " . . .	53	50	53
Metacarpus of fourth <sup>1</sup> " . . .	57	53	56
First phalanx of " " " . . .	32	26	26
Second " " " " " . . .	35	28	29
Tibia . . . . .	35	32	33
Hindfoot . . . . .	25	20	21
Metacarpus of fifth finger . . .	56	—	—
First phalanx of fifth finger . . .	28, <sup>5</sup>	—	—
Second " " " " " . . .	26	—	—

<sup>1</sup> In BOCAGE's paper it reads a second time "3<sup>me</sup> doigt", it might, however, be assumed that he means the fourth in the second place.



Length of skull of *R. sjöstedti* about 40 mm. Frontal region of skull between post-orbital processes somewhat convex. Molars not very narrow transversal diameter of first molar 2 mm. and last premolar still thicker.

This new bat is most nearly related to *Roussettus angolensis* (BOCAGE) and differs like that one from *R. leachi* (A. SMITH) = *R. collaris* auct., which lived in the same caves, most conspicuously with regard to the structure of the palate. Unlike *R. leachi*, the new species has only 3 complete palatal elevations and behind those 3 mesially interrupted folds. The presence of only 3 complete palatal elevations was pointed out by BOCAGE as a characteristic for the by him 1898<sup>1</sup> described species *angolensis*. MATSCHIE<sup>2</sup> used the same characteristic as well for the definition of his new genus *Myonycteris*, which comprised the species *torquata* and *angolensis*. The latter has, however, proved to be a true *Roussettus* by its cranial characteristics. The same is also the case with the present new species. As a specific characteristic the number of complete palatal elevations serves very well, and by this among other characteristics the new species is easily separated from another East African bat *R. lanosus*. From *R. angolensis* with the same number of complete palatal elevations, *R. sjöstedti* differs in the structure of the palate having only three (instead of four) mesially interrupted posterior palatal folds. This characteristic may, however, be variable as in the type specimen there are rudiments on one side of a fourth divided fold between the second and third. In addition to this there are many differences in dimensions and other exterior characteristics as is proved by the description above. *R. angolensis* is more hairy, for instance, on the tibia and the interfemoral membrane. The former is said in *R. angolensis* to be covered »en dessus de poils longs et serrés» — — — »jusqu'à l'articulation du pied», — — — »en dessous jusqu'au premier tiers de la jambe» and the latter »presque entièrement couverte en dessous de poils aussi long et aussi fournis que ceux du dos», while in *R. sjöstedti* both these parts are practically naked.

The tibia of *R. sjöstedti* is longer than that of *R. angolensis* but shorter than that of *R. lanosus*. The latter is easily recognized by its small molars.

#### *Rhinolophus augur zambesiensis* ANDERSEN.

*Rhinolophus augur zambesiensis* ANDERSEN, Ann. & Mag. Nat. Hist. Ser. 7 Vol. XIV p. 383.

*Kilimandjaro*: 1 ♀ specimen from Kibonoto, Oct. 1905.

Small upper premolar entirely missing. Forearm 53 mm. No hairs on front surface of sella, which has the posterior connecting process rounded.

Horseshoe not covering the muzzle laterally. Sella rounded above, constricted below the middle, without any hair on its front and lateral surfaces. Posterior connecting process rounded behind, its upper margin a little concave, higher than sella and covered with long hairs. Lateral margins of lancet rather deeply emarginate so that the tip is almost finger-shaped.

Ears extending beyond muzzle, when laid forward. Tip pointed. Outer margin concave below the tip. Its greatest width shorter than distance from outer notch to tip.

<sup>1</sup> Jornal de Sciencias Math. Phys. Nat. da P'Acad. Real d. Sc. Lisboa, ser. 2, T. V. 1898, p. 133.

<sup>2</sup> Die Megachiroptera, Berlin 1899.

In the folded wing the end of the first joint of the third and fifth fingers reach just beyond the elbow. Plagiopatagium inserted at the tarsal joint. Tail a little shorter than second joint of third finger. 8—9 muscular bands across the longitudinal one extending from the elbow to tip of fifth finger.

General colour above brown, fur rather long, about 1 cm., with very pale basal parts and brown ends. Underside light brownish grey.

Length of nose-leaf from anterior margin of horseshoe to posterior point of lancet . . . . .	14,5 mm.
Greatest width of horseshoe (in spirit) . . . . .	8 »
Length of ear from base of inner margin to tip . . . . .	22 »
» » forearm . . . . .	53 »
» » metacarpal of 3d finger . . . . .	36,5 »
» » 1st joint » » » . . . . .	19 »
» » 2nd » » » . . . . .	30 »
» » metacarpal » 4th » . . . . .	41 »
» » 1st joint » » » . . . . .	11 »
» » 2nd » » » . . . . .	18 »
» » metacarpal » 5th » . . . . .	41 »
» » 1st joint » » » . . . . .	14 »
» » 2nd » » » . . . . .	15 »
» » tail . . . . .	29 »
» » tibia . . . . .	22 »
Greatest length of skull . . . . .	24,5 »

This bat must be related to the *augur* group but differs from its members except *Rh. augur zambesiensis* in the absence of the small upper molar. The noseleaf is longer than in *augur* and allies which also have the posterior connecting process »triangular, obtusely pointed»,<sup>1</sup> not rounded as in this one. The ear is shorter in the *augur*-group, but the tail somewhat longer and the same is also the case with the tibia.<sup>2</sup>

From *Rh. fumigatus* and allies this bat is easily distinguished by the absence of hairs on the front surface of the sella, and from *Rh. deckenii* by the absence of the first small premolar in the upper jaw, by the smallness of the nose-leaf etc.

#### *Rhinolophus* sp. (conf. above).

*Kilimandjaro*: 1 ♂ specimen from Kibonoto, <sup>22</sup>/7 1905.

Small upper premolar outside the tooth row in the angle between the canine and next premolar which sit quite close to each other.

Horseshoe not covering the muzzle on the sides. Shape of nose-leaf as in the foregoing. Ears similar to those of the foregoing.

<sup>1</sup> K. ANDERSEN: Ann. & Mag. Nat. Hist. Ser. 7, Vol. XIV, p. 380.

<sup>2</sup> Since this already was in print I have received a communication from Dr. K. ANDERSEN, who has compared this and the following specimen with his *Rh. augur zambesiensis*, that he thinks they ought to be referred to that subspecies in spite of the differences.

In the folded wing the first joint of the third and fifth fingers reach plainly beyond the elbow. Plagiopatagium inserted 5—6 mm. above the tarsal joint. Only 6 muscular bands across the longitudinal, one extending from the elbow to tip of fifth finger. Tail much longer than in the foregoing.

General colour above rather pale brown, below very pale brownish grey.

Length of nose-leaf from anterior margin of horseshoe to posterior point of lancet . . . . .	15 mm.
Greatest width of horseshoe (in spirit) . . . . .	8 »
Length of ear from base of inner margin to tip . . . . .	21,5 »
» » forearm . . . . .	55 »
» » metacarpal of 3d finger . . . . .	36,5 »
» » 1st joint » » » . . . . .	19,5 »
» » 2nd » » » . . . . .	30 »
» » metacarpal » 4th » . . . . .	42 »
» » 1st joint » » » . . . . .	11,5 »
» » 2nd » » » . . . . .	19 »
» » metacarpal » 5th » . . . . .	41,5 »
» » 1st joint » » » . . . . .	14 »
» » 2nd » » » . . . . .	17 »
» » tail . . . . .	33,5 »
» » tibia . . . . .	22 »
Greatest length of skull . . . . .	23,5 »

The outer appearance of this specimen as well as the measurements of this bat are very similar to those of the foregoing. The principal differences consist in the presence of a small upper premolar, the greater length of the second joint of the fifth finger and of the tail, and in the different insertion of the plagiopatagium in this latter. These two latter characteristics combined produce naturally a quite different shape of the plagiopatagium of the two specimens. In the former its posterior margin is almost straight, and in the latter it extends on either side of the tail as a triangular flap with deep emarginations on either side. The first described female is considerably more robust than the male, it is also certainly older and its teeth are more worn. It is very difficult in a case such as this with only two specimens of different sex and age at hand to form any definite opinion whether the differences are due to sex and age or to racial difference. The absence of the small upper premolar in the female specimen may be due only to age. The greater length of the forearm and some of the finger joints in the male may be secondary sexual features, but the different numbers of muscular bands and the differences in the insertion of plagiopatagium is less easily explained in this way. As the material is so scanty I think it is best to leave the question open for the present (conf. note).

The male specimen differs from *Rh. deckenii* PETERS with regard to the size of the nose-leaf and the ears, the insertion of the plagiopatagium, and the length of the tail etc.



**Trienops afer** PETERS.

*Trienops afer* PETERS, DOBSON, Cat. Chiroptera p. 125.

*Usambara*: 2 alcoholic specimens from the Mkulumusi caves near Tanga  $4/6$  1905. — 1 dry specimen from the same locality and date.

**Lavia frons frons** (GEOFFROY).

*Lavia frons frons* GEOFFROY, ANDERSEN & WROUGHTON, ANN. & MAG. Nat. Hist. Ser. 7. Vol. XIX.

*Meru*: 2 specimens, Ngare nairobi  $11/8$  1905.

These belong evidently to the larger race. They were shot among the acacias where they were flying about in broad daylight after they had been scared from their hiding place.

**Nycteris thebaica** GEOFFROY.

*Nycteris thebaica* GEOFFROY, DOBSON, Cat. Chiroptera p. 165.

*Kilimandjaro*: Kibonoto, 4 specimens  $18/7$  1905. — 2 sp.  $20/7$  1905, — 4 sp. Oct. 1905. — 4 sp.  $20/4$  1906, — *Meru*: Ngare na nyuki, 5 specimens  $17/10$  1905.

In one specimen a »second lower premolar» is visible in the tooth row and this may belong to the race called by PETERS *fuliginosa* but as this specimen has been collected among specimens not having this tooth visible it might be a variable characteristic. The time for the parturition of this animal appears to be in October as SJÖSTEDT found a foetus in the uterus of a female the 1st of Oct., but at the end of the month ( $31/10$ ) a female carried her young at the breast. The tail of this young was shorter than the hind-legs not to speak of the relative shortness of the fingers.

These bats were rather numerous on Kilimandjaro. They were mostly found in the underground passages in connection with the huts of the Wadshaggas, when these passages had caved in here and there and thus given free access to the bats.

**Vespertilio (Glischropus) nanus** PETERS.

*Vesperugo nanus* (PETERS), DOBSON, Cat. Chiroptera p. 237.

1 specimen from the Mkulumusi caves near Tanga  $7/6$  1905.

*Kilimandjaro*: Kibonoto, 3 specimens  $16/7$  1905 — 1 sp.  $26/7$  1905 — 1 sp.  $12/8$  1905 — 1 sp.  $17/8$  1905 — 1 sp.  $30/8$  1905 — 2 specimens (female with young)  $31/10$  1905 — 8 specimens (females and young)  $26/11$  1905 — specimens from the cultivated zone, Kibonoto  $19/4$  1906. — *Meru*: 1 sp. from the rain forest, 3,000 m. above the sea  $21/12$  1905.

The adhesive pads are well developed already in almost naked young. The youngs of this species as well, seem to be born in October. A female caught the  $25/11$  1905, had three youngs each measuring nearly 3 cm.

*Colëura afra* PETERS.*Colëura afra* PETERS, DOBSON, Cat. Chiroptera p. 365.*Usambara*: 3 alcoholic specimens from the Mkulumusi caves, near Tanga  $\frac{4}{6}$  1905.  
— 2 dry specimens from the same caves at Tanga  $\frac{2}{7}$  1906.**Insectivora.***Crocidura fischeri* PAGENSTECHER.*Crocidura fischeri* PAGENSTECHER, Jahrb. wiss. Anstalt, Hamburg 1884 p. 34.*Meru*: 1 specimen from a termite hill on the Massai steppe near the river Ngare na nyuki  $\frac{20}{10}$  1905.*Crocidura hirta* (PETERS).*Sorex hirtus* PETERS, Reise nach Mossambique. Säugethiere p. 78.2 specimens from the bush steppe between *Kilimandjaro* and *Meru* (between Kibonoto and the Natron lakes),  $\frac{3}{8}$  1905.*Crocidura fumosa* THOMAS.*Crocidura fumosa* THOMAS, Ann. & Mag. Nat. Hist. Ser. 7, Vol. 14.*Kilimandjaro*: 2 specimens from Kibonoto resp.  $\frac{4}{7}$  and  $\frac{10}{4}$  1905 — 1 sp. from the cultivated zone, Kibonoto, 1,300—1,900 m. — *Meru*: 1 specimen from Ngare na nyuki 1905 — 4 spec. under the bark of an old tree trunk in the acacia forests at Ngare na nyuki, Nov. 1905.

My friend Mr. OLDFIELD THOMAS has kindly communicated in a letter that he agrees with me concerning the determination of one of these specimens which was submitted to him for inspection.

These specimens were almost blackish but there is also a brown face of the same species.

*Crocidura fumosa* THOMAS; brown faee.*Kilimandjaro*: 5 specimens from Kibonoto, July 1905 — 1 sp. Nov. 1905 — *Meru* low lands 1 sp.  $\frac{26}{1}$  1906.*Crocidura maurisca* THOMAS.*Crocidura maurisca* THOMAS, Ann. & Mag. Nat. Hist. ser. 7. Vol. 14.*Kilimandjaro*: 1 specimen from Kibonoto,  $\frac{19}{4}$  1906. — *Meru*: 4 specimens from the acacia forests at Ngare na nyuki, Nov. 1905.

This species was originally described from British East Africa. Mr. THOMAS has kindly stated the correctness of this determination.

## Carnivora.

### *Mellivora ratel* (SPARRMAN).

*Mellivora ratel* SPARRMAN, MATSCHIE, Die Säugethiere Ostafrikas p. 88.

*Kilimandjaro*: 1 native skin from Kibonoto Nov. 1905. — 1 skull and skin from the cultivated zone at Kibonoto <sup>14</sup>/<sub>4</sub> 1906.

The latter is much more dirty yellowish grey above, the former ashy grey. The specimen obtained <sup>11</sup>/<sub>4</sub> was caught in a steel-trap and it had chewed of the whole foot inside the trap and swallowed it, fragments of the phalanges being found in its ventricle together with rotten meat from the bait and large larvæ of the beetle *Dynastes*. The body of this animal had only a faint odour of mush.

### *Canis variegatus* CRETZSCHMAR.

*Canis variegatus* CRETZSCHM., DE WINTON, Proc. Zool. Soc. London 1899 p. 537.

*Kilimandjaro*: 1 ♀ specimen from the Kibonoto steppe <sup>22</sup>/<sub>8</sub> 1905. — *Meru*: 1 ♀ specimen from Ngare na nyuki, Jan. 1905.

The first of these specimens is an old specimen with worn hair, large teats and seminude underside so that it certainly represents an old female which has had young lately. The second is younger, has a finer fur coat and brighter colours.

The dentition of the latter is abnormal as the third upper premolar is lacking on both sides, thus presenting an unnatural diastema.

Both these specimens belong to the species called *variegatus* by CRETZSCHMAR and their skulls agree with DE WINTON's figure, but the material is not sufficient to decide whether there is any subspecific difference.

### *Canis mesomelas* SCHREBER.

*Canis mesomelas* SCHREBER, SCLATER, Fauna of South Africa, Mammals I, p. 92.

*Kilimandjaro*: 1 specimen from Leitokitok <sup>22</sup>/<sub>9</sub> 1906.

This specimen is certainly smaller than South African specimens. The basal length of the skull is 136 mm. and its zygomatic breadth is 86 mm. while the upper carnassial tooth measures 17 mm. in length and the length of the nasals in the mesial line is 51 mm. If such small dimensions were constant in specimens from East Africa they might indicate a geographic subspecies in this region. NOACK described 1897<sup>1</sup> a small variety of the *C. mesomelas* type under the name of *Schmidtii* from the Somali land. But this was still smaller, it had especially very short nasals (42 mm.). To judge from NOACK's description the Somali form appears to have brighter colours than the present specimen as well. The blackbacked Jackal of Kilimandjaro may therefore not be made identical with the variety from the Somali land but forms perhaps a connecting link between the same and the South African type.

<sup>1</sup> Zool. Anzeiger XX p. 519.



In his book »Die Säugethiere Ost Afrikas» MATSCHIE has mixed up this form with *C. variegatus* and uses that name for the blackbacked Jackal of German East Africa, which may deserve a third name of its own if the characters alluded to are constant.

*Canis adustus* SUNDEVALL.

*Canis adustus* SUNDEVALL, MATSCHIE, Säugethiere Ost-Afrikas p. 65.

*Kilimandjaro*: 2 specimens from Ngare nairobi, <sup>2</sup>/<sub>6</sub> 1906. — 1 specimen (♀) from Kibonoto <sup>9</sup>/<sub>8</sub> 1905 and 1 specimen badly damaged by insects.

The skulls of these specimens agree in every essential point with the skull of one of SUNDEVALL's types, a female as well, which is kept in this museum. Both have the very characteristic appearance figured and described by DE WINTON<sup>1</sup> under the head of »*Canis lateralis* SCLATER». The author mentioned is somewhat uncertain whether *Canis adustus* SUNDEVALL and *C. lateralis* SCLATER are identical or not. A comparison of DE WINTON's description of the characteristics of the latter with SUNDEVALL's types proves that both these Jackals certainly have so much in common that they form a natural unit. It becomes then rather a matter of taste whether one wants to regard them as forming a single species which must be known under the oldest name *adustus* and may be subdivided into several geographic subspecies, or it may be deemed desirable to create a separate subgenus for them as HILZHEIMER has done and proposed the name *Schæffia* for the same.<sup>2</sup> As DE WINTON has pointed out and HILZHEIMER confirmed these Jackals have »several characters which bridge over the separating line one would like to draw between the Jackals and the Foxes.» (DE WINTON 1899 Proc. Zool. Soc. p. 543.) Among the exterior characters the long white-tipped tail has been especially mentioned. The long, flat and narrow skull is also rather fox-like the more so as (at least in females) in one of SUNDEVALL's types and some of the present specimens the postorbital processes are slightly concave.

SCLATER's plate of the type of *Canis lateralis*<sup>3</sup> resembles very much especially the female of SUNDEVALL's types which has the same black colouration of the tail and the lateral band just as plainly visible. The distinguishing features are less easy to recognize.

It is also difficult to ascertain whether there is any subspecific difference between the Kilimandjaro-Jackal of the *adustus*-type and the true South-African *adustus*. The members of the *Canidæ* are more subjected to variation than some modern writers appear to realise. There is also in some instances an important difference between the sexes which is even well visible on the skulls. The difference in basicranial length amounts to 6 mm. between two specimens of the present collections. DE WINTON has fully appreciated the differences in colour and markings which these Jackals may display. The same thing is proved by one of these specimens as well, in which the otherwise very conspicuous white tip of the tail is substituted by a few white hairs only, which are very little visible and not at all at some distance.

<sup>1</sup> Proc. Zool. Soc. 1899 p. 542.

<sup>2</sup> Zool. Beobachter (Zool. Garten) XLVII p. 364.

<sup>3</sup> Proc. Zool. Soc. 1870.

The most striking difference between the present specimens and SUNDEVALL's female type which is best preserved, is that the former have their tail less intensely black and somewhat shorter. The former characteristic may, however, be due to the wearing off of the tips of the hair, and perhaps to difference in age as well. Older specimens appear to have blacker tails than younger. The coloured plate which MIVART has published in the »Monograph of the Canidæ», and which represents a male specimen of the *adustus*-type from Kilimandjaro proves fully that the Jackals of that region at least sometimes have the tail just as intensely black as the true *adustus* from South Africa.

The length of the tail with the hair of these Kilimandjaro specimens is 35—40 cm. while even the female of SUNDEVALL's types has the same measurement amounting to 46 cm. The measurement indicated by W. L. SCLATER in »The Fauna of South Africa» (I p. 96) for the South African *adustus* is 18 inches, that is 45—46 cm. From these facts it might be supposed that the southern variety might have a somewhat longer tail than the East African. It is true that MATSCHIE has recorded the same measurement for *C. adustus* from German East Africa to 45 cm. in his book Säugethiere Ost-Afrikas (p. 65) 1895, but he had himself not seen any Jackals of this kind from East Africa then, as he mentions further down on the same page.

Another characteristic is perhaps of more importance. DE WINTON says in his already quoted description (l. e. p. 542) of »*Canis lateralis*»: »Distinct dark dashes on the lower part of the forearm.» These »dark dashes» may also be seen represented on the plate in MIVART's work quoted above and they are very well developed on the forelegs of the present specimens although blackest in the two oldest specimens.

These »dark dashes» are furthermore not only colour patches but are formed by the black tips to otherwise rusty brownish hairs, which are longer and stiffer than elsewhere on the forearm. These hair attain a length of nearly 3 cm. on the better of these two specimens. They are firmly pressed down to the limb and form therefore not a brush but a kind of a thick and elongated hair cushion in front of the carpal joint. This thickening of the hair-cover can easily be felt but if it corresponds to some internal structure (glands?) or not, cannot, unfortunately, be discerned on the skin. There is nothing similar to this to be seen on the forearm of the skins of *Canis mesomelas* and *C. variegatus* from the same district. On SUNDEVALL's types of *C. adustus* the hair on top of the carpal joint are a little prolonged but less than in the present specimens, and in the female there is no dark dash at all and in the male it is much less than in the Kilimandjaro specimens. The question is then whether these »dark dashes» on the forearm always are absent or at least faintly developed in the South African *C. adustus*. W. L. SCLATER does not mention them in his description of the species in the book on »The Mammals of South Africa».

In the year 1902 NEUMANN described a species of Jackal from Kaffa which he named *C. kaffensis*.<sup>1</sup> This seems to differ much more from the *adustus*-type as it has no white tip to the tail etc. The skull resembles that of *C. adustus* in its profile, length of the palate etc. but the nasals do not extend so far backwards as in *C. adustus*.

<sup>1</sup> Sitzber. Ges. Naturf. Freunde. Berlin 1902 p. 53.

About Jackals in general Professor SJÖSTEDT says: »They were rather common everywhere on the steppes, especially at Ngare na nyuki, Ngare nairobi, Kirarúgua and Leitokitok; they extended through the cultivated zone of the mountain as well, so that, for instance one, was shot quite close at our camp (1300 M.).»

*Lycan pictus venatus* THOMAS.

(Ann. & Mag. Nat. Hist. Ser. 7 Vol. IX p. 439.)

Prof. SJÖSTEDT observed on the Meru steppe (conf. below) dark Jackal-looking animals with white tails, but did not succeed in coming near enough to kill one of them. These were, no doubt, specimens of *Lycan* and probably the subspecies of the same which has been described by THOMAS from British East Africa under the name quoted above. This subspecies is said to be very dark »with at least twice as much black as yellow» and its tail is yellow, black and white. As there is no material collected of this kind it cannot be fully stated to which species these »black Jackal-looking animals with white tails», but the supposition expressed above appears to be most probable.

Professor SJÖSTEDT has written as follows in his diary about the incident hinted at above: »The <sup>28</sup>/<sub>3</sub> I saw at Ngare na nyuki some black jackals with white tails. They kept themselves, 8 in number, out on the open steppe. They did not run away when a gazelle was shot (I did not see them before), but scampered away afterwards like dogs sometimes in a file, sometimes scattered over the steppe. Now and then they halted and looked back, then they continued their pace, spying backwards behind small hills. Although several shot were fired after them, so that even one of them seemed to be hit, they did not increase their speed to a full run, but their celerity was nevertheless considerable.»

*Crocotta kibonotensis* n. sp.

(Pl. 5, fig. 1; Pl. 7, fig. 1.)

*Kilimandjaro*: 1 ♀ ad. from the Kibonoto steppe, <sup>8</sup>/<sub>9</sub> 1905.

When my friend Professor MATSCHIE in the year 1900 published a paper about »geographische Formen der Hyänen»,<sup>1</sup> he gave the specific name »*germinans*» to a Spotted Hyæna from East Africa and expressed by this name a hint that future researches probably would prove the existence of several geographic forms of Spotted Hyæna in East Africa. This supposition is now to become a fact. Professor SJÖSTEDT's collection contains material of two Spotted Hyænas which are as well very distinct from each other — a glance on the plate (Pl. 7) will convince everybody about this — as different from hitherto described forms. One of these two Hyænas is a short-tailed, red animal, the other is comparatively more long-tailed and dark grey. The type of MATSCHIE's *Crocotta germinans* is from the neighbourhood of Lake Rukva (Lake Leopold) and is short-tailed. A comparison is thus only needed between this one and the short-tailed Hyæna from the Kibonoto steppe. With regard to the colour this is easily done.

<sup>1</sup> Sitz. Ber. naturf. Freunde. Berlin 1900 p. 18.



*The Lake Rukwa Hyæna* (according to MATSCHIE).

Ground colour light brown (»hellbraun») mane on back and shoulders clay brown (»lehmbraun»).

(Lower side of?) neck and chest dirty whitish grey.

Belly whitish brown.

Flanks, shoulders, hamches, and thighs with dark brown spots, which on the latter are considerably smaller than on the flanks and not sharply defined.

Posterior portion of back on either side of vertebral line with a row of great blackish brown spots.

Sides of neck not spotted.

Upper parts of head dirty brownish grey.

Lower lip blackish grey.

Forefeet dirty brownish grey.

Hindfeet brownish grey with dark brown toes.

Tail of the same colour as the flanks, terminal third, and below blackish brown.

Length of head and body 132 cm. (♂).

Length of tail without hair 22 cm.  
with hair 33 cm.

*The Kibonoto Hyæna*

pale tan on the flanks becoming more rusty red towards the mane.

Sides of neck rust-coloured like the mane, the lower side white.

Dirty whitish with small brown spots.

Sides of body and legs down to carpal and tarsal joints with dark brown spots which are well defined but somewhat varying in size. The spots are not quite so dark on shoulders and forelegs as on hindlegs where they are almost blackish.

Similar.

With two rows of almost confluent but hardly conspicuous spots of a somewhat darker shade of rusty.

Greyish brown, dark brown on the snout.

Sides of head paler gradually shading into greyish white on the throat.

Similar.

Yellowish grey a little mixed with rusty brown.

Dirty yellowish brown mixed with rusty.

Proximal half coloured like flanks terminal half with a big black tuft.

150 cm. (♀).

22 cm.

34 cm.

The dimensions of the skulls of the type of *Crocotta germinans* are also different in several respects from those of the Hyæna from Kibonoto as is apparent from the following table of measurements:

	<i>Crocotta germinans.</i>	<i>C. kibonotensis.</i>
Basilar length of skull . . . . .	236 mm.	231 mm.
Greatest zygomatic breadth . . . . .	196 »	171 »
Least interorbital width . . . . .	67 »	58 »
Distance between upper end of <i>foramina infraorbitalia</i> . .	74 »	60 »
Least postorbital width of skull . . . . .	49,5 »	47 »
Width of palatal opening at <i>sutura palato-pterygoidea</i> . .	27,5 »	26,5 »
Distance between outer sides of outer upper incisors . .	38 »	38 »
Distance between upper carnassial teeth at their hind end	105 »	89 »
Distance between the <i>bulle</i> at the foramen situated at the middle of their inner side . . . . .	27,5 »	26,5 »
Length of upper carnassial tooth . . . . .	35 »	36 »
Length of upper third premolar . . . . .	23,7 »	22 »

The posterior margin of the palate of *C. germinans* is described by MATSCHIE with the following words: »Der Ausschnitt des *Palatum* ist vorn ziemlich tief und oval.» The

same may be said about the red Hyæna from Kibonoto as well. The lateral contour lines of the occipital surface when seen from behind run quite straight, forming an acute angle in *crista sagittalis* both in *C. germinans* and *C. kibonotensis*.

The upper molar is present as a slight rudiment on one side, absent on the other.

It is evident that *C. germinans* and *C. kibonotensis* resemble each other in several respects, but at the same time the differences are easily seen and make them quite distinct. With regard to the skull the former is much broader across the facial, interorbital and palatal portions, although the length of the two skulls compared are almost practically identical (5 mm. difference).

Their areas of distribution are also widely distant and the intervening district is, as it seems, inhabited by another Spotted Hyæna. There is namely sufficient reason to believe that *C. kibonotensis* has been killed at the southern frontier of its distribution and that it really is at home north of Kilimandjaro. Thanks to the kindness of my friend Professor MATSCHIE, to whom I also owe the opportunity of measuring the skull of the type of *C. germinans*, I have been allowed to see in the R. Zool. Museum in Berlin two skins of a red Hyæna killed at the Njiri lakes north of Kilimandjaro by SCHILLINGS. These I think belong to the same race as SJÖSTEDT's red Hyæna from Kibonoto. They were reddish all over. The spots on the fore quarters were not so dark nor so sharply defined as those on the hind quarters which were almost blackish. The tail was short. The feet of the older specimen were reddish brown.

A skull of a spotted Hyæna in the R. Zool. Museum Berlin, collected at Kibwesi by HÜBNER may also belong to the same form. Its basilar length was 225 mm., the interorbital width 53,5 mm., the distance between the upper carnassial teeth posteriorly 89 mm., the length of the upper carnassial tooth 36,5 mm.

A skull collected by SCHEFFER in British East Africa (R. Zool. Mus., Berlin) had a basilar length of 220 mm. interorbital breadth 57,5, distance between upper carnassial teeth posteriorly 87,2 mm.

There was, however, no skin to the latter skull, so I do not like to give any definite opinion about it. The occiput was also different in shape but this may, at least to some extent, be due to difference in age. A couple of skins from Kibwesi were reddish, especially anteriorly.

*Crocotta panganensis* n. sp.

(Pl. 5, fig. 2; Pl. 7, fig. 2.)

*Kilimandjaro*: 1 specimen from Kibonoto, May 1906. — 1 skeleton of a young but adult specimen from the Kibonoto steppe April 1906.

This Hyæna is very different from the red *C. kibonotensis* as well in colour as to cranial characteristics. Its ground colour is brownish ash, shading into rusty brown in the mane of the withers and upper neck. Black spots distributed all over the body and flanks and down on the legs where they gradually become confluent with the blackish brown ground colour of these parts. Feet dark brown, on the forefeet a little mixed with rusty brown. Lower parts of body grey mixed with blackish and with less defined black spots. Sides of neck dirty ochre yellow with some little defined, dark spots, lower

side of neck dirty whitish. On the back a series of irregular spots larger than the others on either side of and close to the vertebral line. Upper parts of head and face brown, much mixed with black, upper parts of snout black. Sides of head paler brown, less mixed with black. Region below the ears yellow. Chin dark brown. Proximal half, or a little more of the tail coloured as the body with two dark spots, the remaining terminal portion of the tail black. Length of head and body about 120 cm., length of tail without hair 31 cm. with hair 40 cm.

The colour of this *Hyæna* as well as the dimensions of its tail make it very easily recognised. The relative dimensions of the skull are also very different from those of *C. kibonotensis* as may be seen from the following measurements.

	Type.	Younger specimen.
Basilar length of skull . . . . .	249 mm.	202 mm.
Greatest zygomatic breadth . . . . .	166 »	146 »
Least interorbital width . . . . .	53 »	46,5 »
Distance between upper end of <i>foramina infraorbitalia</i> . . . . .	54 »	52,5 »
Least postorbital width of skull . . . . .	47,5 »	46 »
Width of palatal opening at <i>sutura palatopterygoidea</i> . . . . .	29,7 »	28 »
Distance between outer sides of outer upper incisors . . . . .	37,5 »	35 »
Distance between the <i>bullæ</i> at the foramen at the middle of their inner side . . . . .	27,5 »	21 »
Distance between upper carnassial teeth at their posterior end . . .	91,3 »	85 »
Length of upper carnassial tooth . . . . .	37 »	35 »
Length of upper third premolar . . . . .	22 »	19 »

There is no trace of an upper molar in the older specimen, but in the younger there is a small molar on the right side. From these measurements is apparent that the grey long-tailed *Hyæna* has a narrower forehead and snout than the red short-tailed one. The palate of the former is, however, broader and especially the palatal opening is broader, the *laminae pterygoideae* are less vertical and the free posterior palatal margin does not form an even curve but an obtuse angle, because the border of either side runs straight and forms in the mesial line with that of the other side a little more than a straight angle, slightly rounded at the apex.

The lateral contour-lines of the occiput are not straight, but curve in the upper portion towards the sagittal crest.

In the R. Zoological Museum in Berlin I have had the opportunity of seeing a couple of skins of spotted *Hyænas* from the Pangani district. These were similar to this one and I think that they belong to the same race having a brownish grey ground colour with sharply defined spots, and dark brown feet.

The Spotted *Hyænas* were according to SJÖSTEDT common on the steppe and in the cultivated zone. A couple of Hippopotamus-skeletons hung up to dry attracted them in numbers to the camp (1,300 m.). A sick negro was one night carried off from his hut near the camp and devoured by *Hyænas*. They eat also the corpses which the Wadschaggas lay out in the »bush». One evening a Massai-man died in a hut situated a stone-throw from the camp. The corpse was carried out by the relatives the same night only a little way from the hut. Next morning when Prof. SJÖSTEDT aided by a Massai-man went



to secure the skeleton there were only some fragments of bone and some rags of the shirt, which the dead man had had around his waist, left. The Hyænas had made a clean sweep.

#### Hyæna schillingsi MATSCHIE.

*Hyæna schillingsi* MATSCHIE Sitz. ber. Ges. nat. Fr. Berlin 1900 p. 55.

*Meru*: 1 specimen from the acaia forest at Ngare na nyuki, <sup>23</sup>/<sub>10</sub> 1905.

The colour-pattern of the skin agrees perfectly with MATSCHIE's description, but the distance between the *foramina infraorbitalia* of the skull is 47 mm.

#### Viverra civetta orientalis MATSCHIE.

*Viverra (Civetta) orientalis* MATSCHIE Säugethiere Ost-Afrikas p. 72.

*Kilimandjaro*: 1 specimen from the cultivated zone Kibonoto, April 1906.

The spots become confluent to longitudinal bands on the hind quarters. Only this specimen was observed and the animal appeared thus to be less common.

#### Genetta suahelica MATSCHIE.

*Genetta suahelica* MATSCHIE Verh. d. V Internat. Zool. Congress Berlin 1901 p. 1143.

*A*, normal: *Kilimandjaro*: 5 specimens from Kibonoto, July, 1905 — 4 specimens from the cultivated zone at Kibonoto resp. <sup>14</sup>/<sub>8</sub> (♀), <sup>18</sup>/<sub>8</sub>, <sup>25</sup>/<sub>8</sub> and <sup>31</sup>/<sub>8</sub> 1905 — 1 specimen from the same locality, May 1906 — 1 specimen without locality.

*B*, melanistic: *Kilimandjaro*: 1 ♀ from Kibonoto <sup>10</sup>/<sub>8</sub> 1905 — 4 specimens from the cultivated zone at Kibonoto resp. <sup>18</sup>/<sub>8</sub>, <sup>24</sup>/<sub>8</sub>, <sup>21</sup>/<sub>9</sub> and <sup>3</sup>/<sub>10</sub> 1905 — 1 specimen from the same locality, April 1906.

These melanistic specimens look quite black, but in some shades of light the four rows of spots on either side are fully conspicuous.

»This animal was common at Kibonoto, also the melanistic variety was often seen. It steals poultry from the natives and sneaked sometimes into our huts to get hold of shot birds hanging there. They were often caught alive by the Wadsehaggas who carried several specimens to me tied to a stick.» (SJÖSTEDT)

#### Nandinia gerrardi THOMAS.

*Nandinia gerrardi* THOMAS Ann. & Mag. Nat. Hist. 6 ser. Vol. 12 p. 205.

*Kilimandjaro*: 1 specimen from the banana farms at Kibonoto, <sup>20</sup>/<sub>7</sub> 1905 — 1 ♀ and a foetus from the same from the same locality, <sup>31</sup>/<sub>10</sub> 1905 — 1 skin from Mombo (MARTIENSSEN).

This animal is known on the kidsehagga language under the name »ndrano» or »drano».

The gravid female had only two young in the uterus, and one of them was preserved. This foetus had already attained a length of nearly 12 cm. without tail, and was hairy. A mesial dark stripe on top of the neck is well developed and on either side another stripe, although less sharply defined, can be seen. This indicates that the striped pattern of the neck of *Nandinia binotata* is a more primitive character than the absence of such

stripes in *N. gerrardi*. The absence of stripes is not always complete even in the full-grown animal. On the skin from Mombo the mesial neck-stripe is quite conspicuous and the lateral ones may be traced. In the two other skins too, there is a faint indication of a mesial stripe. If thus the characteristic derived from the skin in this respect not always may be quite sharp there are others derived from the skull which are quite satisfactory for the distinction of the two species. The constriction of the skull behind the postorbital processes in the eastern species, is especially striking as may be seen from the following measurements. In a skull of *Nandinia binotata* from the Gold Coast with a basiscranial length of 87 mm, the least width of the skull behind the postorbital processes is 15,5 mm, while in two skulls from Kibonoto with a basiscranial length of resp. (♂) 99 mm and (♀) 88 mm the same measurement is resp. 13,5 and 12 mm.

***Mungos cafer* GMELIN.**

*Herpestes caffer* GMELIN, MATSCHIE Säugethiere Ost-Afrikas p. 78.

*Kilimandjaro*: 1 specimen from Kibonoto <sup>3</sup>/<sub>7</sub> 1905 — 2 specimens from the cultivated zone at Kibonoto <sup>24</sup>/<sub>8</sub> 1905.

None of these specimens is fullgrown. The last molar is not yet fully developed. The greatest length of two skulls is 83 mm. and their greatest breadth 41 mm. The underfur is greyish brown in one, in the other a little more inclining to rufous.

***Mungos sanguineus ibeæ* WROUGHTON.**

*Mungos sanguineus ibeæ* WROUGHTON Annals & Magazine Nat. Hist. Ser. 7, Vol. XX p. 118.

*Kilimandjaro*: 1 specimen from Kibonoto <sup>5</sup>/<sub>7</sub> 1905 — 1 specimen shot when running over a path in the farm at Kibonoto <sup>11</sup>/<sub>9</sub> 1905 — 1 specimen from Kibonoto, May 1906.

The member of the »*Herpestes gracilis*-group» which inhabits Kilimandjaro agrees most closely with WROUGHTON's description under the above quoted name, and the measurements of skin and skull are practically identical, except that the zygomatic breadth is, by the author quoted, said to be 35 mm., while in the only skull from Kilimandjaro available to me the same measurement is only 30 mm. This difference is rather large but it cannot be ascertained whether it is constant or not.

***Mungos galera robusta* (GRAY).**

*Herpestes galera* (ERXL.) var. *robusta*. TRUE Proc. U. S. Nat. Mus. Vol. 15. 1892 p. 452.

*Kilimandjaro*: Kibonoto, 1 ♂ specimen <sup>9</sup>/<sub>8</sub> 1905 — 1 specimen <sup>22</sup>/<sub>8</sub> 1905 — 1 specimen <sup>27</sup>/<sub>8</sub> 1905.

The first mentioned of these specimens is the darkest with very fine and shiny fur of a blackish brown colouration. The others are less dark which is due to the rings of the hairs being broader and more rufous. The old male has a skull of the same size as that recorded by TRUE (l. c.).

*Cynelurus guttatus* HERMANN.

*Cynelurus guttatus* HERM., MATSCHIE Säugethiere Ost-Afrikas p. 70.

1 young specimen from Sigillari, the steppe between *Meru* and *Kilimandjaro*, June 1906.

This species is not common according to SJÖSTEDT. A specimen kept alive by a farmer was said to have been caught on the steppe between Kilimandjaro and Meru.

*Felis leo* subsp. *sabakiensis* n.

(Pl. 3 fig. 4).

*Kilimandjaro*: 1 ♀ killed by the natives at Kibonoto in the cultivated zone, 1,500 m. above the sea, <sup>31</sup>/<sub>8</sub> 1905 — 1 ♀ shot by Prof. SJÖSTEDT in the plains NW. of Kilimandjaro, Leitokitok, <sup>26</sup>/<sub>5</sub> 1906. («Diameter of eye 28 mm. Iris yellow.»)

These two lions are very different in colour. The first is much darker and might be termed yellowish brown, in some lights almost rufous with black tips to the hair. The lower side is yellowish white with numerous round, pale rufous spots. This specimen was sick when shot and had probably in consequence of this left its regular haunts in the plains.

The other specimen is sandy grey, becoming more yellowish on the flanks, white beneath without any spots.

The dimensions of the skull of these two female Lions are:

	»Reddish» spec.	Grey spec.	»Reddish» specimens killed by SCHILLINGS (R. Zool. Mus., Berlin)		
Basilar length . . . . .	243 mm.	258 mm.	255 mm.	240 mm.	260 mm.
Zygomatic breadth . . . . .	195 »	215 »	196 »	191 »	205 »
Interorbital » . . . . .	55 »	62 »	63 »	63 »	63 »
Least postorbital width . . . . .	60 »	57 »	61,5 »	56,5 »	59 »
Distance between tips on either side of mesial palatal notch. . . . .	8,5 »	13,5 »	—	—	—
Breadth of palatal opening just behind the <i>sutura palatopterygoidea</i> . . . . .	33,5 »	37 »	37 »	35 »	41 »
Distance between <i>bullæ</i> in front. . . . .	28 »	28 »	26 »	26 »	29 »
» » tips of postorbital processes . . . . .	88 »	103 »	92 »	92 »	96 »
Length of upper carnassial . . . . .	34 »	32 »	37 »	33 »	36 »
Breadth of <i>squama occipitalis</i> above the condyli . . . . .	74 »	70 »	76 »	72 »	72 »
» » » » at basal third . . . . .	60 »	60 »	61 »	58 »	61 »
» » » » second » . . . . .	40 »	40 »	50 »	43 »	47 »
Height » » » . . . . .	65 »	62 »	62 »	57 »	63 »

At the side of these measurements of the skulls of Prof. SJÖSTEDTS female lions are put some measurements of three skulls of female lions shot by SCHILLINGS and now kept in the R. Zool. Museum in Berlin where I have had the opportunity of measuring them, thanks to the courtesy of Professor MATSCHIE. SCHILLINGS' lions were of a »reddish» type. The grey and reddish lions in SJÖSTEDTS collections are, as may be seen, a little different. The differences in width between the postorbital processes is of less account as the specimen from Kibonoto was younger and weaker. The differences



in interorbital width may be due to the same cause. Otherwise the measurements of these two specimens agree very well inter se and with those of SCHILLINGS' specimens. The shape of the occipital surface is the same in all. The distance between *laminae pterygoideæ* is distinctly greater than that between the *bullæ* anteriorly. This I take to be an important character which is shared by a male specimen shot by SCHILLINGS, as well, but in opposition to the condition found in the type of NEUMANN'S *massaicus* where the distances between the *bullæ* and the *laminae pterygoideæ* are about equal. In all SCHILLINGS quoted specimens, as well as in SJÖSTEDT'S, the *foramen magnum* is very high compared with its breadth while in NEUMANN'S *massaicus* it is transversally extended so that it seems very broad to its height. If all these cranial characteristics are taken together I think that it might be concluded that all these 5 specimens the cranial measurements of which have been recorded above, belong to one and the same race, in spite of the colour differences between SJÖSTEDT'S specimens, and that this race is different from NEUMANN'S Massai lion. The area of distribution of this lion is, no doubt, on the northern side of Kilimandjaro, although the sick specimen killed at Kibonoto had strayed away a little — just as the red Hyæna described above.

The Kilimandjaro lion is not identical with NOACK'S *somaliensis* and it may therefore be the best way to give a separate subspecific name to it indicating its geographic origin and I then propose the name *sabakiensis*.

The lions were, according to SJÖSTEDT, very numerous on the northwestern side of Kilimandjaro especially at Leitokitok and Gasorai. When a giraffe bull was killed there <sup>25</sup>/<sub>5</sub> 1906 a great number of lions collected round the camp near which the skinned body lay on the steppe. SJÖSTEDT himself saw the shining eyes of half a score of lions and the natives stated that there were as many on the other side of the camp. The night was very dark so that only one specimen could be killed when it passed through the light area of a small lantern hanging on a Massai spear at the dead body of the giraffe. The killed specimen had its ventricle filled with large pieces of meat and skin of a zebra. The plentiful supply of game (antelopes, gazelles, zebras) in this district explains the fact that the lions did not actually attack the men in the camp, although they tore down and devoured the meat of the giraffe which the natives had cut in long strips and hung on a small acacia. The negroes themselves lay sleeping under the same tree and were roused by the lions jumping for the meat hanging on the branches. They rushed, of course, in a great hurry, and very scared, to the camp but none was hurt.

#### *Felis pardus nimr* (HEMPR. & EHRENB.).

*Felis (Leopardus) nimr* EHRBG., MATSCHIE Säugethiere Ost-Afrikas p. 69.

*Kilimandjaro*: 1 specimen from Leitokitok <sup>29</sup>/<sub>5</sub> 1906 and another from Kibonoto.

The Leopard is according to SJÖSTEDT common in the surroundings of the mountains especially among the acacia forests at Ngare na nyuki and Leitokitok. Although it prefers the steppe with its herds of gazelles and other game, it is also found in the cultivated zone, according to the natives, where it used to eat the corpses of the Wadschaggas which at Kibonoto were not buried but laid out in the bush.

**Felis (Zibethailurus) serval SCHREBER.**

(Pl. I fig. 3)

*Felis serval* SCHREBER, MATSCHIE Säugethiere Ost-Afrikas.

*Kilimandjaro*: 1 skin (badly damaged by insects) from Ngare nairobi, skinned by the natives. — *Usambara*: 1 skin of a melanistic variety presented by Mr MARTIENSSEN at Mombo.

A young specimen caught near the mountain was held in captivity for some time. »It became, with every day more beautiful but at the same time more ill-tempered and hissed and spitted as soon as anybody came near it. Finally it succeeded in escaping» (SJÖSTEDT).

**Felis ocreata GMELIN aff.**

A specimen of Wild Cat was shot at Moschi on evening in July when SJÖSTEDT visited the officers stationed there. This specimen was presented to him and the skull is preserved, but the skin appears to have been lost and subsequently it cannot be decided which subspecies it represented.

**Rodentia.****Helioscirtus undulatus TRUE.***Sciurus undulatus* TRUE Proc. U. S. Nat. Mus. XV 1892 p. 465.

*Kilimandjaro*: 2 specimens from the farms at Kibonoto, <sup>2</sup>/<sub>8</sub> 1905 — 1 specimen from the rain forest, 2,000 feet above the sea, Kilimandjaro, <sup>5</sup>/<sub>11</sub> 1905 — 1 specimen from the cultivated zone at Kibonoto, Nov. 1905 — 2 specimens from the same locality April and May 1906 — *Usambara*: 2 specimens from Mombo <sup>26</sup>/<sub>8</sub> 1906.

The specimens from Mombo are a little lighter with broader white tips to the hairs, but otherwise similar.

**Funiscirtus ganana RHOADS.***Sciurus ganana* RHOADS Proc. Acad. Philadelphia Vol. 48 1896 (1897) p. 522.

*Kilimandjaro*: 1 (♂) specimen from Kibonoto June 1905. »Length of body 13 of tail 16 cm.» — 2 (♂ ♀) specimens from the cultivated zone at Kibonoto <sup>26</sup>/<sub>8</sub> 1905 — 1 specimen from the same locality Nov. 1905 — 2 specimens from the same locality, May 1906 — 1 (♀) specimen from Moëmbe, *Usambara* June 1906. — *Usambara*: 2 specimens from Mombo, June 1906.

If this species (*ganana*) proves to be identical with PAGENSTECHER'S: *Sciurus cepapi* var. *aruscensis*<sup>1</sup> the latter name has priority. This supposition is mentioned, because some of the specimens (one young from Kibonoto and two specimens probably from Mombo) are much paler on the lower side which may be termed dirty yellowish white. The last mentioned specimens differ, however, from the young one from Kibonoto in having paler feet, yellowish brown, while those of the latter are rufous. This

<sup>1</sup> Jahrb. Hamburg. wiss. Anst. 1884.

gives a hint that there possibly may be two geographic races, one darker on the back, more rufous on the feet and more reddish yellow on the under parts, and another more yellowish grey, even with an olive greenish tint on the back, more ochre coloured on the feet and dirty yellowish white on the lower parts. The former should inhabit the interior and the Kilimandjaro district, the latter Usambara, and perhaps the coast district. The limits between these are not sharp, however, and intergrading specimens may be found.

This squirrel is probably identical with the one which TRUE has recorded as *Sciurus poensis* in Proc. U. S. Nat. Mus. 1892 p. 467, and he found darker and paler specimens in his material as well.

In his book on the »Säugethiere Ost-Afrikas» MATSCHIE uses the name *Sciurus cepapi* (l. c. p. 40) for this same animal, but he describes a related form from Usambara and Tanga under the name »*Sciurus pauli*». This is said to have the »Endhälfte des Schwanzes einfarbig sammetsschwarz mit weissen langen Haarspitzen», and this characteristic is not to be found in any of the present specimens. None of them presents the slightest trace of a lateral stripe as *Sc. ochraceous* shall do. More material from different places and collected at different times of the year is needed before the question about these small squirrels of East Africa can be settled.

The following notes about »the small squirrel from Kilimandjaro» from SJÖSTEDT's diary may refer to this species. »It has a fine repeated neighing sound and a coarser abrupt sound. Usually it sits leaning much forward and the upward curved tail strikes up and down when the squirrel emits its sounds. It may sometimes for a good while sit on a branch in the shadow of the foliage and continue its noise while the whole body trembles and the mouth is widely open.»

#### *Xerus rutilus* CRETZSCHMAR.

*Xerus rutilus* CRETZSCHMAR, NEUMANN, Zool. Jahrb. Syst. 1900, p. 545.

*Usambara*: 1 specimen from Mombo, June 1906.

According to Prof. SJÖSTEDT the same species was also observed in the acacia forests at Ngare na nyuki (*Meru*).

#### *Graphiurus parvus* (TRUE).

*Eliomys parvus* TRUE, Proc. U. S. Nat. Mus. Vol. 16, 1893 p. 601.

*Kilimandjaro*: 1 specimen from Kibonoto <sup>17</sup>/<sub>8</sub> 1905.

This specimen agrees well with TRUE's description except that its size is considerably less, although it is fullgrown to judge from the teeth. The length of head and body is hardly more than 70 mm. and the length of the tail vertebrae 65 mm., but as the skull is broken and there is only one specimen at hand, I have decided to name it as above. The type of *G. parvus* was collected somewhere at Tana river, British East Africa.

#### *Graphiurus murinus* (DESM.).

*Eliomys murinus* DESM. MATSCHIE, Säugethiere Ost-Afrikas p. 44.

*Kilimandjaro*: 1 specimen trapped within the cultivated area, Kibonoto, 1,300 m. above the sea, <sup>19</sup>/<sub>7</sub> 1905 — 1 specimen caught in a hut among rubbish <sup>2</sup>/<sub>8</sub> 1905.



Both these specimens have the hairs of the tip of the tail tipped with whitish. This characteristic may, however, also be found in South African specimens as I have stated on a specimen from »Caffraria» in this museum. South African specimens, which I have seen, appear to be larger than these two are. There is thus quite possible that, if this characteristic proves constant, Kilimandjaro is inhabited by a separate race, but two specimens are hardly sufficient to decide this question.

***Tatera mombasæ* WROUGHTON.**

*Tatera mombasæ* WROUGHTON, Ann. Mag. Nat. Hist. ser. 7, Vol. 17, 1906 p. 493.

*Meru*: 5 specimens from the acacia forests at Ngare na nyuki<sup>25</sup> 11 1905 — 1 specimen from the same locality Jan. 1906.

These specimens agree with WROUGHTON's description, but some are a little larger attaining a length of head and body of about 140 mm. and of tail up to 180 mm. The length of the tail is also a little variable as two specimens of almost the same size have the length of their tails somewhat unequal.

This species cannot be identical with »*Meriones leucogaster*» PETERS from Mozambique because the latter has the tail shorter than head and body. WROUGHTON has expressed a doubt whether *T. mombasæ* might be joined as a subspecies with PETER's *leucogaster* but I think that both are specifically different.

SJÖSTEDT found this *Tatera* to be common in the acacia forests at Ngare na nyuki where it was caught in the thickets formed by shrubs and »bayonet-plants» (*Sanseveria*) which like islands were isolated by open stretches covered with black volcanic sand. In the same thickets were also found other species of rodents, as well as shrews.

***Mus hildebrandti* PETERS.**

*Mus hildebrandti* PETERS, Monats-Ber. Akad. Wiss. Berlin 1878 p. 200.

*Kilimandjaro*: 13 specimens from Kibonoto, first part of July 1905 — 2 specimens from the same locality <sup>9</sup>/<sub>10</sub> 1905 — *Meru*: 8 specimens from the acacia forests at Ngare na nyuki Jan. 1906.

The fecundity of these animals must be remarkably great. One female had on the left side 10, and on the right 8 teats, another on the left side 7, and on the right 10 teats. The number of teats is thus very great but not constant. Their position is also variable, sometimes two teats sit rather close together.

It was the common »house rat» in the huts of the natives.

***Mus jacksoni* DE WINTON.**

*Mus Jacksoni* DE WINTON, Ann. & Mag. Nat. Hist. ser. 6, Vol. 20, 1899 p. 318.

*Kilimandjaro*: 1 specimen Kibonoto, July, 1905.

Mr THOMAS has kindly identified this specimen. *Mus jacksoni* was originally described from Uganda.

**Mus hindei THOMAS.**

*Mus hindei* THOMAS, Ann. & Mag. Nat. Hist. ser. 7. Vol. 9. 1902 p. 218.

*Kilimandjaro*: 2 specimens Kibonoto, July, 1905.

Mr THOMAS has kindly compared one of these specimens with the type, which is from Maehakos, British East Africa.

**Leggada (Mus) minutooides A. SMITH.**

*Mus minutooides* A. SMITH, W. L. SCLATER, Fauna of South Africa II p. 51.

*Kilimandjaro*: 1 specimen found among dry leaves in a banana farm, Kibonoto <sup>6</sup>/<sub>8</sub> 1905. — 3 specimens found under stones on the Kibonoto steppe, <sup>24</sup>/<sub>8</sub> 1905. — 1 specimen under leaves in a banana farm, Kibonoto, <sup>9</sup>/<sub>9</sub> 1905. — *Usambara*: 1 specimen from Mombo, June 1906.

**Thamnomys (Mus) dolichurus (SMUTS).**

*Mus dolichurus* SMUTS, MATSCHIE, Säugethiere Ost-Afrikas p. 52.

*Kilimandjaro*: 2 specimens from Kibonoto <sup>15</sup>/<sub>7</sub> 1905 — 1 specimen from the same locality <sup>3</sup>/<sub>3</sub> 1906.

**Lophuromys aquilas (TRUE).**

*Mus aquilas* TRUE, Proc. U. S. Nat. Mus. Vol. 15, 1892 p. 460.

*Kilimandjaro*: 1 specimen (tail mutilated) found in the farms at Kibonoto, <sup>20</sup>/<sub>7</sub> 1905.

This species was originally described from Kilimandjaro but has since then been rediscovered in other parts of East Africa.

**Arvicanthis pulchellus (GRAY).**

*Mus (Lemniscomys) barbarus* L. var. *Massaicus* PAGENSTECHER, Säugethiere des Massailandes, p. 45, Jakob. Hamburg wiss. Anst. 1884.

*Mus (Isomys) pulchellus* GRAY, POUSARGUES, Ann. de Se. Natur, ser. 9. Vol. 4, 1897 p. 1.

*Kilimandjaro*: 5 specimens from Kibonoto, July 1905 (labeled resp. <sup>4</sup>/<sub>7</sub>, <sup>6</sup>/<sub>7</sub>(2), <sup>7</sup>/<sub>7</sub> and <sup>25</sup>/<sub>7</sub>) and 1 specimen <sup>21</sup>/<sub>8</sub> 1905.

»From the cultivated zone and down to the bush steppe, rather common.»

**Arvicanthis neumanni (MATSCHIE).**

*Mus neumanni* MATSCHIE, Sitzber. naturf. Freunde, Berlin 1894 p. 204.

*Kilimandjaro*: 1 specimen from the mountain meadows 3,000 m. above the sea at Kiboseho <sup>23</sup>/<sub>2</sub> 1906 rescued from the claws of a hawk.

The lower side of this specimen is rusty coloured thus differing to some extent from MATSCHIE'S description in which the lower parts are said to be »weiss etwas grau überflogen».

***Pelomys fallax* PETERS.**

*Pelomys fallax* PETERS Reise nach Mossambique. Zool. Säugethiere p. 157.

*Kilimandjaro*: 1 specimen (with the head crushed in the trap) from Kibonoto  $4/7$  1905 — 1 ♂ specimen caught in a trap at the station at Kibonoto  $9/11$  1905 — 1 specimen from *Meru* low lands  $20/11$  1905.

***Tachyoryctes splendens ibeanus* THOMAS.**

*Tachyoryctes splendens ibeanus* OLDFIELD THOMAS, Proc. Zool. Soc. 1900 p. 179.

*Kilimandjaro*: 1 specimen from the cultivated zone at Kibonoto, July 1905 — 4 specimens from the same locality  $16/7$  1905 — 1 specimen from the uppermost part of the rain-forest, *Meru*, 4,000 m. above the sea  $3/2$  1906 — 1 specimen from the northern side of *Kilimandjaro* Leitokitok  $27/5$  1906 — 2 specimens without exact locality. — 1 quite young specimen from Moschi, *Kilimandjaro*,  $13/6$  1906.

All these specimens are darker than the typical *T. splendens* and have their heads sooty blackish and may thus certainly be referred to the subspecies described by Thomas from Mount Kenia. The last mentioned young one from Moschi is quite black all over and I should not have dared to refer it to this species, as the skull is wanting, if I had not had the great pleasure of being favoured by my friend Dr OLDFIELD THOMAS' opinion about it.

»This species lived as well on the steppe as in the cultivated zone. Their heaps of earth resembled mole hills and were seen here and there. They were obnoxious in the farms and the Wadschaggas used to catch them and brought them to me tied to a stick.» (SJÖSTEDT.)

***Myoscalops argenteo-cinereus* (PETERS).**

*Heliophobius argenteo-cinereus* PETERS Reise nach Mozambique zool. Säugethiere p. 140.

*Kilimandjaro*: 1 specimen from Ngare nairobi  $28/5$  1906.

***Hystrix galeata* THOMAS.**

*Hystrix galeata* THOMAS Ann. & Mag. Nat. Hist. (6) XI, 1893, p. 230.

*Kilimandjaro*: 1 ♀ specimen Kibonoto,  $21/8$  1905 — 1 somewhat younger specimen with the last molar still unused) from the same locality Nov. 1905. — 1 skin of a less than halfgrown specimen from the same locality, March 1906.

The two adult specimens belong certainly to *H. galeata* and show very clearly the character derived from the relative dimensions of the nasals which have been pointed out by THOMAS. If the relation between the breadth of the nasals at the posterior end of the naso-premaxillary suture and the breadth of the same at the anterior edge of the same suture is expressed in percent, the latter dimension is, according to THOMAS' measurements in a Gambian *H. cristata* 54 %, in *H. galeata* 74 %, and in *H. africa-australis* 52,4 % of the former. According to my own measurements the same percentages are for two specimens of *H. africa-australis* from South Africa, both rather young and with the last molar not fully developed (just cutting the gum), resp. 55,9 and 60,1; and for



the present specimens of *H. galeata* resp. 70,7 (the younger) and 74,0 (the older). This shows very plainly the difference and indicates at the same time that in *H. africæ-australis* the nasal opening is narrowed with increasing age as the percentages from my younger specimens are greater than that from THOMAS' older.

As far as my material is concerned the nasal processes of the premaxillaries of *H. galeata* are much broader than the same of *H. africæ-australis*. At the middle of the nasal sutures their width is in the two specimens of *H. galeata* resp. 17 and 22 mm. while the same dimension in two specimens of *H. africæ-australis* is resp. 9 and 13 mm.

As THOMAS has remarked the length of the nasals of *H. galeata* is greater than the same of *H. africæ-australis*. Measured in a straight line these bones are in the latter (semiadult) 73 mm. in the former (semiadult) 83 and (adult) 96 mm. On the contrary the frontals measure in the median line in the former 44 and in the two latter resp. 31 and 33 mm. In *H. africæ-australis* the length of the nasals (in a straight line) is in young specimens shorter than, and in adult about equal to the distance from the naso-frontal suture to *crista occipitalis*. In *H. galeata* the latter distance is but 70 % (adult) to 74 % (young) of the nasal length. In *H. galeata* a *crista sagittalis* extends from the occipital crest forward over  $\frac{3}{5}$  to  $\frac{2}{3}$  of the parietalia. It is thus better developed than in *H. africæ-australis* and *H. cristata*. In *H. africæ-australis* *foramen magnum* extends a good deal up on *squama occipitalis*, so that its upper margin is only about 24 mm or less from the upper margin of the occipital crest while the same distance in *H. galeata* is about 31 mm. So far as my material is concerned, the distance between the middle of the occipital condyles is in *H. africæ-australis* less than the height of *foramen magnum* in *H. galeata* about equal to it, and in *H. cristata* the transversal dimension is the greater. The antero-lateral portion of *lacrymale* which is seen outside and in front of the orbit is comparatively much narrower and smaller in *H. galeata* than in *H. africæ-australis*.

There are several other cranial differences that could be pointed out in which *H. galeata* differs from the South African as well as from the Mediterranean porcupine but what is said may suffice to fully confirm THOMAS judgement which was based only on one skull.

The two specimens recorded above are chiefly blackish; the bristles forming the anterior crest are to great extent whitish in the distal parts. The quills of the back are ringed, the blackish rings being much broader than the white. As a rule each quill has only three white rings which are narrow, often less than 1 cm. seldom if ever  $1\frac{1}{2}$  cm. The ends are as a rule broadly white. The quills round and on the tail are wholly white (the central ones) blackish at their base only.

#### *Hystrix galeata ambigua* n.

(Pl. 7, fig. 3).

A third specimen from the same locality (Kibonoto) collected the 23th of May 1906 is more difficult to form any certain opinion about. It is very old and all sutures are closed which makes the matter still more doubtful concerning the dimensions of the different bones. The skull resembles however, in several respects *H. africæ-australis* more than *H. galeata*. The broadest part of the frontals is, for instance, at the edge of the

lacrymal bones, not at the rudimentary postorbital processes. The nasal opening is much narrower than in *H. galeata* and the percentage expressing the relation between the breadth of the nasals at both ends of the naso-premaxillary suture is 57, thus similar to that of *H. africe-australis*. *Foramen magnum* has almost the same shape as in the last mentioned species.

The nasals are certainly very large (longer than their distance from the occipital crest) but hardly in the same degree as in *H. galeata* which is elucidated by the fact that the distance from the nasofrontal suture to the occipital crest in the adult of that species corresponds to only 70 % of the distance from the same suture to the anterior end of the nasals, but in the present specimen the same percentage is nearly 80. The nasals reach accordingly not so far back in the present specimen as in the typical *H. galeata* although it is very old. If the length of the frontals is compared with the length of the nasals the former is not by far contained twice in the latter in *H. africe-australis*, but in *H. galeata* about  $2\frac{2}{3}$  times and in the present specimen this relation appears to be approximately the same. In *H. galeata* and the present specimen the frontal region of the skull measures in the mesial line about as much as the distance from *sutura coronalis* to the occipital crest, while in *H. africe-australis* the former is much the longer. The nasal process of the premaxillary of the present specimen is very broad as in *H. galeata* or even broader, thus much different from *H. africe-australis*. Likewise the *lacrymale* is small as in *H. galeata*. The distance from the lower end of *lacrymale* to the zygomatic suture is in the latter about  $12\frac{1}{2}$  mm. in the present specimen 13 mm. but in a specimen of *H. africe-australis* only 5 mm.

On the other hand this specimen has, in spite of its great age, no *crista sagittalis* as *H. galeata*, but the areas for the insertion of muscles on the sides of the skull leave a  $6\frac{1}{2}$  mm. broad flat area in the middle of the parietal surface in front of the occipital crest. This reminds more about the condition found in *H. africe-australis*.

The zygomatic process of the maxillary is also very different from that of *H. galeata*. In the latter its greatest breadth in front of the orbit is about 11 mm., in a South African specimen of *H. africe-australis* it measures  $17\frac{1}{2}$  mm., and in the present specimen its width is similar or even a little more. In *H. galeata* the zygomatic process from *squamosum* is almost horizontal, but in *H. africe-australis* it slopes rather strongly downwards the latter is also the case with the present specimen.

There may be quoted still more cranial characteristics proving that the present specimen in some cases agrees more with *H. galeata* in others with *H. africe-australis* and in still others is intermediate or differs from both. These aberrations from both species quoted are far too great to be interpreted as individual variations, and it does not seem probable that the specimen in question is a hybrid. I think it is most reasonable to assume that it is the representative of an intermediate geographic race which I propose to call *Hystrix galeata ambigua*. *H. galeata* was described from British East Africa, Lamu, thus from the country to the north-east of Kilimandjaro but later also found in Uganda (Proc. Zool. Soc. 1901 p. 87). It has been made probable above (see for instance about the Spotted Hyænas) that a northern and a southern fauna meet at Kibonoto. *H. g. ambigua* may then represent a more southern or perhaps rather south-western race

which is different as well from the northern *H. galeata* as from the south-eastern *H. africe-australis* (type-locality etc., Querimba). It is also possible that *H. galeata ambigua* is the Poreupine of the Meru mountain which has happened to come across to Kilimandjaro in one specimen.

Prof. SJÖSTEDT found a quill of a poreupine <sup>26</sup>/<sub>1</sub> 1906 in the rain forest on Meru in an altitude of 3,000 m. so that it is stated that poreupines live on that mountain as well, although no specimen was procured there. As a rule the poreupines hide themselves very well and it is only accidentally that some specimen may be procured by the natives. The specimens from Kibonoto were all of them obtained in the cultivated zone.

### *Lepus* sp.

Prof. SJÖSTEDT observed when marching round Ngare na nyuki and Ngare nairobi a few times single hares which were alarmed by the approaching caravan and with lightning speed zig-zaged away over the steppe. As he had no gun at hand at these opportunities no specimen was obtained and it can only be stated that some species of hare lives there on the steppe.

## Hyracoidea.

### *Dendrohyrax validus* TRUE.

*Dendrohyrax validus* TRUE Proc. U. S. Nat. Mus. XIII 1890 p. 227.

*Kilimandjaro*: 1 ♂ ad. from the rainforest 2—3,000 m. Kibonoto <sup>23</sup>/<sub>8</sub> 1905 — 1 ♀ ad. from Kibonoto Sept. 1905 — 1 ♀ specimen from Kibonoto 2,500 m. <sup>2</sup>/<sub>10</sub> 1905 — 1 ♀ specimen Kibonoto <sup>31</sup>/<sub>10</sub> 1905 (the ventricle full of leaves) — 2 specimens from the same locality <sup>3</sup>/<sub>11</sub> 1905 — 1 ♂ specimen from the rainforest 2,500 m. Kibonoto <sup>1</sup>/<sub>11</sub> 1905 — 5 youngs from the rain forest at Kibonoto 2,000 m. <sup>23</sup>/<sub>8</sub> 1905 — 1 specimen from the rainforest 2,000 m. Kibonoto, Nov. 1905 — 1 specimen from the rainforests 2,500 Kibonoto, Nov. 1905.

In the five quite young specimens the dorsal spot is only faintly developed in three specimens in the two others it cannot be traced.

Prof. SJÖSTEDT has written about them in his diary: »The small youngs (7 in a set) I learned to know as very agreeable little beings. In the box in which they were kept there was a chirping as from birds, or an almost grunting, fine sound which was repeated in chorus of the whole set. As soon as the cover was lifted the youngs began to jump up along the walls in which proceeding they usually succeeded as the box was not very high. If the hand was put down to the soft little animals they began, finely grunting, to climb up on the same with their soft paws which were quite pleasant to feel. They liked to crawl up on the arm in the sleeve apparently delighted with the warmth.»

»A couple was seen pairing in a banana form within the cultivated area <sup>27</sup>/<sub>8</sub> 1905.»

»It was heard in the rainforest of *Meru*, 3,000 m. Dec. 1905.»



## Proboscidea.

### *Elephas* sp.

»On the western side of Kilimandjaro Elephants were rather common and a herd seemed to have its regular haunts in the forest belt round Kiraragua river. From there the Elephants wandered down to the rivers Sanya, Lima and Nassai. They were more numerous, however, towards NW or NNW where a herd containing about 16 animals was seen. As it is forbidden to shoot Elephants in the Kilimandjaro district they were, of course, not molested. On Kilimandjaro fresh tracks were seen in Febr. 1906 at Kibosho in the upper most parts of the rainforest and lower parts of the mountain meadows at an altitude of 3,000 m. On Meru tracks were seen in Jan. 1906 in the upper rain-forest about 3,500 m. above the sea.» (SJÖSTEDT.)

## Perissodactyla.

### *Diceros bicornis* (LINNÉ).

(Pl. 4, figs. 2 & 3).

*Kilimandjaro*: 1 specimen skeleton and skin ♂ ad. from the steppe at Ngare Nairobi <sup>26</sup>/<sub>11</sub> 1905. — *Meru*: 1 specimen (skeleton and skin) ♀ ad. from the Hippopotamus lakes (Lake Merker) <sup>4</sup>/<sub>3</sub> 1906.

The length from snout to vent of the male specimen was 3 m. The circumference of the neck behind the ears 1,44 m. The girth round the chest 2,54 m. Both specimens are »fullgrown but young».

»The Rhinoceroses were in some places rather common, especially round the Hippopotamus lakes between Meru and Kilimandjaro, at Ngare Nairobi and Ngare na nyuki. The male and female specimens which were shot for the collections and of which skin and skeletons were procured had both of them numerous larvæ of Oestridæ in the ventricle. I succeeded to hatch one of these (*Spathicera meruensis* SJÖSTEDT n. sp.) after a couple of months rearing and thus definitively solve the problem about these larvæ of Oestridæ known for more than half a century. The larvæ found by me belonged to two species, both different from a third form found by SCHILLINGS in this region. It is thus proved that in the same part of Africa at least 3 different species of *Oestridæ* infest the ventricle of the *Rhinoceros*.» (SJÖSTEDT) (For a full report about this see SJÖSTEDT: 10 Diptera, 2 Oestridæ of this work.)

### *Equus chapmani böhmi* (MATSCHIE).

*Equus böhmi* MATSCHIE: Sitz. ber. Ges. Naturf. Freunde Berlin 1892 p. 131.

*Kilimandjaro*: 2 specimens from Ngare Nairobi resp. <sup>12</sup>/<sub>8</sub> (jun.) and <sup>15</sup>/<sub>8</sub> (♂ ad.). — *Meru*: 2 specimens from Ngare na nyuki resp. <sup>17</sup>/<sub>10</sub> and <sup>18</sup>/<sub>10</sub> (♀ ad.).

Two of these zebras have shadow-stripes upon the haunches, although not very sharply developed. The two others have none. As these four specimens belong to practically the same herd, it is evident that the presence or absence of shadow-stripes

is not a constant character in this case. Consequently, as this was the supposed difference between *E. böhmi* MATSCHIE 1892 and *E. granti* DE WINTON 1896, the latter of these names has to be regarded as synonymous with the former.

As a rule the zebras live on the open plains but when they go to their watering places they must pass through the acacia forests which surround the rivers. It thus may happen that a zebra is shot in a forest.

»The zebras were seen in herds containing much more than a hundred heads, on the grass steppes at Ngare nairobi and Ngare na nyuki (conf. Pl. 4, fig. 1). They like, as is well known, the company of the Gnus.»

»A small filly accompanying the mother was seen <sup>29</sup>/<sub>3</sub> 1906.» (SJÖSTEDT.)

## Artiodactyla.

### *Potamochoerus cheroipotamus demonis* FORSYTH MAJOR.

*Potamochoerus cheroipotamus demonis* FORSYTH MAJOR Proc. Zool. Soc. 1897 p. 367.

*Kilimandjaro*: 1 young specimen from the cultivated zone at Kibonoto March 1906.

FORSYTH MAJOR has given the Bushpig of Kilimandjaro this subspecific name ten years ago, and it is used here for that reason, although the specimen is too young to allow any corroboration of MAJOR'S views. The colour of the specimen is on the sides mixed black and rusty. On the back and forehead the rusty red is dominating, a white dorsal crest is developed on the anterior part of the back. On the sides of the neck, on the chest, and legs the black is dominating.

Professor SJÖSTEDT says that the Bushpigs were very common but at the same time very difficult to shoot so that he could only obtain this specimen. They are very obnoxious in the farms, and the Wadshaggas must keep watch every night to protect their crops against the predations of the Bushpigs. Excrements of the Bushpig were seen in the rainforest of *Meru*, about 3,500 m.

### *Phacochoerus alicani* CRETZSCHMAR subsp. ?

*Phacochoeres alicani* CRETZSCHMAR Atlas Reise nördl. Afr. Rüppell 1826 p. 61.

*Kilimandjaro*: 3 semiadult specimens (♂, ♀) from the bush-steppe between Kibonoto and the Natron lakes <sup>5</sup>/<sub>9</sub> 1905. — 1 specimen (jun.) from the Kibonoto steppe Oct. 1905. — 1 ♀ ad. from the Kibonoto steppe, <sup>23</sup>/<sub>10</sub> 1905. — 1 quite newborn pig from the same locality, <sup>4</sup>/<sub>11</sub> 1905. — 1 quite small pig from the Kibonoto steppe <sup>2</sup>/<sub>1</sub> 1906. — 1 old boar near Ngare nairobi. — *Meru*: 1 old boar and 1 pig from Ngare na nyuki <sup>22</sup>/<sub>10</sub> 1905.

»The last days of October three newborn pigs of *Phacochoerus* were seen. They were as dark as the old ones. At the same time another one, somewhat older, perhaps two—three weeks, was observed. The 4th of Nov. a new born pig was seen.»

»The Wart-hogs were common in this region and were found almost regularly in some of their favourite places.»

»They belong to the steppe and are not found higher up on the mountain than in the mixed forest. In the cultivated zone they are substituted by the Bush-pigs. The

Warthogs prefer open ground with scattered groups of bushes and trees and the genuine bush- or grass-steppe. On the latter they are to be found far out on the desolate grounds where every tree and bush has disappeared. Here especially in the tree- and bush-steppe are their favourite haunts and here they roam about in families, or the female with her two youngs, and the boars separately. They are not very shy, their sight is not sharp, and with some precaution they are not very difficult to stalk within shooting range even on the open plains.»

Below Kibonoto was a locality much liked by the Wart-hogs and Prof. SJÖSTEDT has written about this in his diary: »One hours and a half walk from Kibonoto over Sanya towards Kirarágua the steppe becomes open. The last trees have disappeared, the plains lie flat before the eyes, with the brushwood often burnt black by the fires of the Massais, with small hills like haystacks often consisting only of termite hills covered with grass, and with faded plants. Further away the bushes have disappeared and likewise the termite hills. The great desolate plains are partly covered with a short grass which grows in tufts leaving the grey, dry and stony ground bare between them. In many places the Massais have burnt off the tufts to get fresh green sprouts for their cattle. The steppe is as far as can be seen a yellow partly blackened sea of grass. Among the black burnt bushes in the land lying between the real grass steppe and the mixed forest below the mountain are the regular haunts of the Warthogs. Here they stroll about usually in families among the black-burnt bushes and on the sooty ground which they resemble in colouration so nearly that, if they remain motionless, they are very difficult to perceive at some distance. If the family is disturbed the old boar raises its big head with its formidable looking tusks, the lifted tail is curved as in a baboon, and taking the lead of his company he trots off with raised head, the others following in a file. Sometimes they disappear among the blackened bushes, sometimes they take their course over the open steppe and may then often be seen at a very great distance when they with raised heads listen and then trot off again, their tails all the time being kept in the air but curved.»

»A couple of pigs of this kind had been caught quite young and a farmer, Hr DOMKE let his dog nurse them. All went well and the pigs grew up and were very tame, following their master on his promenades running after him with the tails raised in the air. For their fostermother they became, however, rather troublesome when their size had increased. She appeared, nevertheless to retain a certain liking for them.»

The meat of the Wart-hogs was regarded by BÖHM to be »ausgezeichnet», but SJÖSTEDT says that he made several repeated attempts to eat it but could not, and he found it to be bad-smelling even if it was cut from young animals.

I have not sufficient adult material to decide with full certainty whether this Wart Hog deserves to be regarded as a distinct subspecies or not. (Conf. supplemental notes-below.)

#### *Hippopotamus amphibius* LINNÉ.

(Pl. 4, fig. 4.)

*Meru*: 2 specimens (2 skeletons and a skin) from the Hippopotamus-lakes,  $\frac{4}{3}$  1906.

»The Hippopotamuses were still rather numerous in the »Hippopotamus-lakes» (Lake Merker) between Meru and Kilimandjaro, nearer the former mountain. 18 were



seen there at one time. The water in these lakes was brown, bitter, bad-smelling and contained a good deal of carbonate of soda. Potamogeton and other water weeds grew here and there and the shores were at some places fringed with a dense growth of *Scirpus*.»

The Hippopotamus lives also in a small lake Kongongare on the eastern side of Meru. It is also known from lake Djipe.»

»A shot and killed Hippopotamus sinks but appears again floating on the surface within  $\frac{1}{2}$  hour.» (SJÖSTEDT.)

***Giraffa tippelskirchi* MATSCHIE.**

(Pl. 1, figs. 1 & 2; Pl. 6, figs. 1 & 2.)

*Giraffa tippelskirchi* MATSCHIE. Sitz. Ber. Naturf. Fr. Berlin 1898 p. 78.

*Meru*: A female specimen (skeleton and skin) gravid when shot  $\frac{10}{10}$  1905 (Pl. 1 fig. 1). (Diameter of eye 40 mm. Iris dark.). — A big bull (skeleton and skin) shot on the steppe NW. of *Kilimandjaro*, Leitokitok  $\frac{25}{5}$  1906 (Pl. 1 fig. 2).

The female agrees in appearance quite well with the plate which has been published by LYDEKKER in Proc. Zool. Soc. London 1905 Pl. XI.

The pattern of the colouration with the irregular and jagged dark spots is plainly shown on the accompanying plate (fig. 1) from Professor SJÖSTEDT's very interesting photos. The spots are a little more jagged and star-like than those on LYDEKKER's plate quoted above. They agree thus better with the fig. of the type communicated by the same author in Proc. Zool. Soc. 1904 Vol. 1 p. 214. But the colour agrees well with the first quoted plate and the spots extend all the way over the yellowish grey cannon bones, but then the phalanges are whitish without spots. The face is strongly mixed with dark, etc.

The bull is spotted almost as far down on the legs and feet as the female, and dark in the face as well. The spots on the body and neck are not quite so jagged and star-like as in the female, but the difference is not so great that it seems to indicate any racial difference. A certain allowance must be made for individual variation, the more so as LYDEKKER has pointed out (l. c. 1904 p. 217 footnote) that the jaggedness of the spots can be less pronounced on one side than on the other in the same specimen. As no adult bull of the typical *G. tippelskirchi* appears to have been collected a direct comparison cannot be made, and thus this one must, at least pro tempore, be regarded as a representative of the same race.

The structure of the skull of this bull is quite remarkable as may be seen on the accompanying figures (Pl. 6 figs. 1 & 2). It has evidently been an old animal as the teeth are well worn, and it seems that such a specimen of this race has not yet been described. As well Professor SJÖSTEDT's photo of the wounded animal as still more the figures of its skull reproduced here (Pl. 6 figs. 182) prove that *Giraffa tippelskirchi* has a great frontal horn when the bull is fully developed. This great frontal horn is not symmetrical to the mesial line of the skull but its main mass lies on the right side of the same. The armament of this Giraffe is, however, not confined to this frontal horn and the main pair of parietal horns. In front of the great frontal horn there are namely no less than three more osseous bosses (fig. 1) and it is of importance to note that these are not placed

symmetrically in the mesial line but more or less completely on the right side of the same (fig. 2). Above the right orbit there is quite a big boss with a basal diameter of about 4—4½ cm. and a height above the orbit of nearly 4 cm. In front of the right parietal horn is another boss with a diameter of about 4⅓ cm., and a third on the right side of the occiput (figs. 1 & 2). The last is more irregular than the others almost 7 cm. broad and 4 cm. long. On the left side there is no extra protuberance on the thickened roof of the orbit. In front of the left parietal horn only a small wartlike tuberosity is seen, the diameter of which is about 1 cm. The occiput of the left side has no osseous excrescences. The striking asymmetry in the armament of the skull extends, however, still further as the two main parietal horns are remarkably different in size and shape (fig. 2), the right horn being somewhat shorter but much thicker and stouter than the left, which is proved by the following measurements. The length of the front surface of the right horn may be estimated to 15 cm. and that of the left to 17 cm. The former is more cylindrical and growing from a bigger base than the latter. It retains at the top surface a diameter of nearly 6 cm (58 mm.) while the diameter of the left horn is at the top end 42—45 mm. The top surfaces are quite different, too, that of the left being evenly rounded and that of the right almost flat. With other words the right horn has such a shape as if a body shaped like the left horn and consisting of a plastic material had been hammered or beaten down from the top end, making it flatter above and thicker. Such a force has also, no doubt, exercised its influence on the right horn as will be explained later on.

As regards the asymmetrical arrangement of the armament this old bull of *Giraffa tippelskirchi* resembles the bull of the Giraffe from South Lado which LYDEKKER (Proc. Zool. Soc. 1904 p. 207) has termed *Giraffa camelopardalis cottoni*. In the latter there is also an azygous orbital horn on the right side (although placed somewhat lower) and »the right main horn is decidedly larger than the left horn». In addition to this LYDEKKER's figure (l. c. textfig. 25 p. 208) shows an azygous osseous boss in front of the right parietal horn of the South Lado Giraffe just as in the present specimen, although nothing is mentioned about this in the text. The author quoted has also stated that, according to Major POWELL-COTTON, »all the male Giraffes from the locality in question seem to be furnished with a similar right orbital horn.» The question arises now, how may this asymmetry in the armament of the adult bulls of the Kilimandjaro and South Lado Giraffes be explained? It appears to me that an explanation is very near at hand, viz. that the Giraffes of these two races have acquired the habit of constantly using the right side of the head when butting. They have thus become »right-headed» if such an expression may be allowed as an analogy to »right-handed» and »left-handed». When the animals thus are constantly knocking just the right side of the head against their antagonists, or other objects, the irritating force produced by this action influences the bony tissue especially the periosteum of this side of the skull above all in such places which are most exposed to the blows as, for instance, the upper brim of the orbit, the right side of the frontal and nasal surfaces etc. and in such places the living tissue responds to the exterior force by producing exostoses. It is a wellknown fact that a lesion of the surface of a bone, that is its periosteum, is apt to produce »splint» or exostoses. When the Gi-

raffes are butting such lesions take place in many of the more or less exposed parts of the skull and this accounts for the generally rugged surface of the facial bones as may be seen as well on the accompanying figures of the Kilimandjaro Giraffe as on LYDEKKER's quoted figure of the South Lado Giraffe. But this ruggedness is, at least in the present specimen, much more pronounced on the right side of the skull, as it ought to be according to the hypothesis of the »right-headedness» of this animal, because this side is more apt to be hurt. In the most exposed places which are repeatedly hurt the results of the reiterated irritation are accumulated and thus finally greater exostoses — bosses — horns are created. But then the originally semipathological structures become useful, partly because they shield underlying organs, partly as weapons. The results of the right-headedness is, however, not only shown by the osseous excrescences on the surface of the skull. As the right side of the head is so to say the »business-side» it has needed a strengthening in a general way to endure the »work» and such a strengthening has evidently to some degree taken place as may be proved by comparing measurements from both sides. The increased size, especially thickness, of the right parietal horn has already been noted above. To this may be added the following:

	Right	Left
Thickness of posterior wall of orbit at the middle . . . . .	25 mm.	21 mm.
Breadth . . . . .	44 1/2	39
(i. e. <i>processus frontalis</i> of <i>jugale</i> )		
Thickness of <i>jugale</i> just behind the orbit . . . . .	18	16
Breadth " " . . . . .	32	28
Length of <i>processus paramastoideus</i> from within <i>meatus auditorius</i>	63 »	61

In a similar way almost all measurements of the hindpart of the skull are a little larger on the right than on the left side. On the occipital surface this is especially conspicuous. *Squama occipitalis* shows a central fossa or groove for *ligamentum nuchæ* divided from the likewise somewhat concave lateral portions by a heavy and solid thickening on either side which from the upper lateral corner of the occiput converge into a big boss just above *foramen magnum*. These thickenings form like two pillars supporting the weight of the cranial roof behind. But the right of these coming from the occipital exostose mentioned above is much larger than the left not only in breadth (37 mm. in the former, 33½ in the latter) but especially in thickness.

On the other hand the left condyle is larger than the right, the former measuring 66 mm., the latter 64 mm. in length from upper, outer corner of posterior surface to lower, inner angle of the same, and resp. 46 and 44 mm. in breadth along the upper margin of the posterior surface. This may probably be in accordance with mechanical laws as well. The right condyle forms the pivot on which the skull turns when the animal butts with its right side and then it is suitable that this is not unnecessarily wide. But the left condyle, or rather the connecting tissues round the same, have to endure a certain straining when the head is violently thrown towards the right side. The power of resistance is in such a case increased by the enlargement of the condyle.



The rough surface on the *basioccipitale* for the insertion of muscles (*m. longus capitis*) is more pronounced and extends further forward on the left side than on the right.

»The Giraffes were still rather common on the acacia-steppes at Ngare na nyuki, where in some places almost everywhere with some intervals their easily recognizable droppings were to be seen. Usually they lived in small companies consisting of 3 to 8 heads, or single. On the northwestern side of Kilimandjaro in western Leito-kitok they were also observed. They lived there in the thin woods of »flute-acacias» which they seemed to like. It was here the big bull was killed the 25th of May 1906. The female (fig. 1) killed at Ngare na nyuki the 19th of Oct. had a rather big foetus in the uterus. The ventricle contained chiefly leaves, pea-pods and pease of acacias.» (SJÖSTEDT).

***Bubalis cokei* (GÜNTHER).**

(Pl. 1, fig. 4).

*Bubalis cokei* GÜNTHER. SCLATER & THOMAS: Book of Antelopes I, p. 27.

*Usambara*: 1 bull and 1 cow from Same, <sup>29</sup>/<sub>6</sub> 1905. — *Meru*: 3 specimens (♂ jun., ♀ ad., ♀ jun.) from Ngare nairobi <sup>13</sup>/<sub>7</sub> 1905. — *Kilimandjaro*: 1 young cow and 1 young calf from near the Natron lakes <sup>1</sup>/<sub>9</sub> 1905. — 1 new-born calf (Pl. 1, fig. 4) from Ngare nairobi <sup>19</sup>/<sub>9</sub> 1905. — 1 young calf from the Kilimandjaro low lands <sup>1</sup>/<sub>11</sub> 1905. — 1 young calf from the Kibonoto Steppe, Nov. 1905. — 1 bull from Ngare nairobi <sup>27</sup>/<sub>5</sub> 1906.

The young calves have a dark stripe along the middle of the back but otherwise nothing dark, not even the tuft of the tail. The youngest (Nov.) of all is more rufous and has no dark dorsal stripe.

»Cokes Hartebeest was common on the steppe round Ngare na nyuki, Ngare nairobi (Pl. 4, fig. 1), Kirarágua, and further NW. and N. of Kilimandjaro, and in several other suitable places: open grass steppe or steppes with scattered »flute-acacias.» It appeared strange that no, or at least very few antelopes, gnus or zebras were to be seen in the country W. and NW. of Meru, although these vast stretches with an abundant growth of grass seemed very inviting and favourable for such animals. The Boers camping in this district may be able to solve this riddle! NW. of Kilimandjaro where a luxuriant grass attaining a length of about 60 cm. and often mixed with clover covered vast stretches the Hartebeests had their favourite haunts. In this district they were very little shy as they were seldom disturbed by men (neither Boers nor Wandorobbos lived here).» (SJÖSTEDT.)

***Connochates albojubatus* THOMAS.**

*Connochates albojubatus* THOMAS. SCLATER & THOMAS: Book of Antelopes. I, p. 105.

*Kilimandjaro*: 1 bull and 1 cow killed at Ngare nairobi resp. <sup>8</sup>/<sub>8</sub> and <sup>9</sup>/<sub>8</sub> 1905. — 1 cow from the same locality, <sup>12</sup>/<sub>8</sub> 1905. — 2 bulls and a cow from the same

locality <sup>14</sup>/<sub>8</sub> 1905. — 1 bull from the same locality <sup>23</sup>/<sub>9</sub> 1905. — 1 young bull (the only one of that age seen) from the Kibonoto steppe <sup>17</sup>/<sub>10</sub> 1905.

All adult specimens are provided with brown or blackish brown, irregularly arranged, transversal stripes on the neck and anterior part of the body. In some specimens there are also some similar but shorter stripes, and spots on the belly and posterior parts. The ground colour is bluish grey. The young bull is not striped and its beard is not white but grizzled grey.

This Gnu lives sometimes in great herds on the grass steppe between Kilimandjaro and Meru but old bulls are often seen alone.

To give an idea about the abundance of Gnu and other big game that happily enough still prevails on the steppes at Ngare nairobi and Ngare na nyuki (Pl. 4, fig. 1) the following lines may be quoted from SJÖSTEDT's diary: »We are soon in the midst of herds of Gnu, Zebra, Grant's Gazelles, Thomson's Gazelles and Kongonis. It is a view such as I did not ever hope to behold with my own eyes. Indeed, until a short time ago I thought that such a thing only belonged to the fiction. In every direction I may look I perceive, Gnus, Zebras, Gazelles and Kongonis. The Gnus stand in a long irregular row, in the middle divided by a herd of Zebras counting 60—80 heads. To the left they are more scattered over the slope of a valley, to the right they form a long front line, most of them turning their horns and black faces towards us. They number about 80 in each herd. In the beginning dusk, and in consequence of their great number they are so little shy that they allow me to advance within a distance of two-three hundred feet and to inspect them where they were standing like a herd of cattle. It was too beautiful to be disturbed! But now they begin to move. The Zebras trot up the slight slope, gather together again, exhibiting in their striped garb an elegance of form a picture of exquisite beauty. After them the Gnus come whipping with their tails and with lowered heads they trot in the same direction. stop, turn round forming a front line, wheel round again and disappear in a cloud of dust on the top of the low hill. We follow, and arrived at the upper end of the slope we behold a view which was the most remarkable scenery I ever have seen. Several herds had already been gathered here before with those the new ones had associated. Gnus and Zebras were there in hundreds, the nearest within quite short distance, some quietly grazing, others listening with their heads turned in our direction.»

*Cephalophus (Sylvicapra) abyssiniensis* THOMAS.

*Cephalophus abyssinicus* THOMAS. SCLATER & THOMAS: Book of Antelopes. I, p. 199.

*Kilimandjaro*: 1 young kid caught by the natives at Kibonoto, <sup>19</sup>/<sub>8</sub> 1905. — 1 female from the Natron lakes, <sup>27</sup>/<sub>4</sub> 1906.

To judge from the dimensions it appears more probable that the latter specimen belongs to the smaller northern variety than to the southern *C. grimmia* (LIN.) but as it is a female and the skull is lost there is not full certainty about it. Most probable the most correct view is to make a separate subspecies for the Duiker of the

Kilimandjaro district, as there appears to be characteristics pointing in such a direction, but for such a proceeding more material is needed.

The kid is per analogiam counted to the same species as the adult.

The black nasal mark of the female extends as a band to the base of the blackish tuft on the crown in strong contrast to the rufous face; chin and throat whitish.

*Rhaphicerus neumanni stigmatus* n. subsp. ?.

(Pl. 6, fig. 3).

*Pediotragus neumanni* MATSCHIE: Säugethiere Ost-Afrikas, p. 120.

*Kilimandjaro*: 1 ♂ killed near the Natronlakes <sup>4</sup>/<sub>9</sub> 1905. — *Meru*: 1 ♂ killed near Ngare na Nyuki <sup>24</sup>/<sub>10</sub> 1905.

Both these specimens differ from MATSCHIE's description in having a dark triangular spot on the nose. This spot is, however, not black but only dark brown in contrast to the rufous face. As the specimens otherwise fully agree with MATSCHIE's description and at the same time differ from the southern type *Pediotragus campestris* THUNBERG I have not hesitated to refer them as above to the *neumanni* type. But if the Steenbok of Kilimandjaro proves to possess in all cases a dark brown nasal marking and NEUMANN's Steenbok from Ugogo never has such a one<sup>1</sup> I think the former must be regarded as a separate subspecies and I propose then for the same the third name *stigmatus*. The difference does not only consist in the absence of the horseshoe-shaped dark marking on the crown, but there are characters derived from the hoofs and skull as well which allow the two species to be easily distinguished from each other. *P. campestris* appears to have rather long hoofs for such a small antelope. In his monograph »The species of the Antelope-genus *Pediotragus* JENTINK<sup>2</sup> writes about *P. campestris*:<sup>3</sup> »hoofs of fore legs: length above 2,9—3,5 cm., crown 1,7 cm.» In a couple of specimens in this museum I have found the corresponding measurements to be resp. 2,6—3,7 and 1,7—1,9 cm. while the same measurements of the present two specimens of *R. neumanni* (two old bucks) are: length above 2,1—2,4 cm. and crown (1,7) 1,9—2 cm. These differences in the measurements give the hoofs a quite different shape. They are short and high in *R. neumanni* and wholly black.

The skull of *R. neumanni stigmatus* is very roughened above. The brims of the orbit are more protruding, and the orbit itself seems to be larger. This is apparent from the following measurements, taken from one of the skulls of *R. n. stigmatus* (the one slightly smaller than the other) and a skull of *P. campestris* from this museum which both have the same basiscranial length viz. 121 mm. and which both have belonged to fully adult bucks.

<sup>1</sup> MATSCHIE has in a letter to the author kindly confirmed this fact.

<sup>2</sup> Notes Leyden Mus. Vol. XXII.

<sup>3</sup> The author quoted has invented a new name »*P. Horstochii*» which, however, is quite unnecessary as will be shown later on.



	<i>R. n. stigmatus</i>	<i>R. campestris</i>
Horizontal distance between anterior brims of the orbit at the middle . . .	47 mm.	43 mm.
Horizontal distance between the lower brims of the orbit at the middle . .	65 "	60 »
Horizontal diameter of the orbit . . . . .	30 »	27 »

Another expression for the greater orbit of *P. n. stigmatus* is found in the vertical through its anterior margin passing almost along the anterior border of the second molar, while in *P. campestris* the corresponding vertical passes almost through the middle of the second molar.

The maxillary below the orbit has also quite a different shape in the two animals. It is much higher and its outer wall above the molar series is more vertical in *R. n. stigmatus*; in *R. campestris* it is lower but convex, almost inflated between the molars and the anteorbital fossa. This is proved by the following measurements from the same skulls as those used above

	<i>R. n. stigmatus</i>	<i>R. campestris</i>
Vertical distance from anterior alveolar margin of middle molar to lower margin of anteorbital fossa . . . . .	20 mm.	14,5 mm.
Distance between the outer sides of the first molars . . . . .	37,5 »	33 »
Greatest width of skull at the maxillaries on a level with the middle of the first molar . . . . .	42,5 »	43 »

If the second of these measurements is subtracted from the third and the thus received sum is divided in halves we get an expression for how much the maxillary protrudes beyond the outer surface of the molars on either side of the two species viz. in *R. n. stigmatus* 2,5 mm. but in *R. campestris* 5 mm. This difference is the more striking as the greatest width across the maxillaries is in the latter species situated much nearer to the alveolar margin than in *R. n. stigmatus*. The second of the three last measurements indicates as well that the palatal breadth of *R. campestris* is less than that of *P. n. stigmatus*.

The length of the horns of the greatest of the two *R. n. stigmatus* at hand is not quite 9 cm. and their tips sit only 44 mm. apart while the same distance in the other specimen is 53 mm.

The nasals of *R. n. stigmatus* are not especially elongated but longer than in *R. campestris*. They measure in the present two specimens resp. about 40 and 49 mm. In this respect this species resembles two other species of *Rhaphicerus* for which JENTINK (l. c. pp. 40, 41) has used the specific names »*rufescens* (H. SMITH)» and »*Kelleni* JENTINK». The latter species is from Angola and differs in having »the horse-shoe-shaped brown marking on the crown of the head broadly developed» — —, »upper parts of a chocolate-milk brown», — — — »the horns in the male — — bent back, slightly curved», — — »upper surface of skull feebly roughened» — — —. If *R. kelleni* has a high maxillary like *P. n. stigmatus* or low like *R. campestris* is not indicated in the description.

Of what he considers to be »*R. rufescens* (H. SMITH)», JENTINK has only had a female. This is said to have been procured from the dealer FRANK in Amsterdam and »it once belonged to Dr. SUNDEVALL's collections and its habitat seems to be Natal», (JENTINK l. c. p. 40). SUNDEVALL often exchanged specimens with FRANK

so this origin of the specimen is very acceptable, but then at the same time it does not seem probable that SUNDEVALL should have given away anything but what he regarded as duplicates. In consequence of this it must be expected that the Natural History Museum in Stockholm possesses one or more specimen of the same kind and this is really the case. Here is a specimen, a buck, collected by the famous traveller and naturalist J. WAHLBERG 1845 in »Caffraria interior (ad tropic.)» according to the catalogue. This specimen agrees with JENTINK's in having long nasals provided with a pointed attenuated tip, and measuring 51 mm. This is no doubt to be regarded as the male to JENTINK's *P. rufescens*. The skull is otherwise more similar to that of *R. n. stigmatus* than that of *R. campestris*, because it has a high and nearly vertical maxillary and a wide orbit. There are, however, differences with regard to the skulls of WAHLBERG's specimen and *P. n. stigmatus* as well, the latter being shorter and broader. This is demonstrated by the following measurements.

	WAHLBERG's specimen	SJÖSTEDT's specimen
Basicranial length . . . . .	127 mm.	125 mm.
Least distance between orbit anteriorly . . . . .	43,5 »	46,5 »
Distance between the middle of upper margins of orbits . . . . .	56 »	61 »
Greatest distance between posterior brims of orbits . . . . .	68,5 »	73 »
Distance between outer sides of horn-cores basally . . . . .	51 »	56,5 »

But especially, *P. n. stigmatus* has much broader and flatter nasals their greatest combined breadth being 20 mm. and the least at the anterior end of the naso-premaxillary suture 12 mm. while the corresponding measurements in WAHLBERG's specimen are resp. 15 and 10 mm. With regard to the colour of the fur the male of JENTINK's »*rufescens*» in this museum is somewhat less rufous than *R. n. stigmatus*, but otherwise they agree with regard to the minute light tips to the hairs which produce an appearance as if the animal was dusty. The dark horseshoe-shaped marking is well developed in the male »*rufescens*». The white marking above the eye is similar in both. They are thus no doubt more related inter se than with *R. campestris*.

Another question is whether really HAMILTON SMITH's name »*rufescens*» can be placed on the *Rhaphicerus* from Natal, as has been done by JENTINK, or not. The colour of the members of the genus *Rhaphicerus* is somewhat variable and specimens which fully agree with regard to the colour with the by JENTINK quoted description, may be found although not all of them are similar in cranial characters and thus belong to other species. This is for instance the case with a young female in this museum which has short nasals, low and very convex maxillaries like *R. campestris* THUNBERG, and as it has been collected in the Cape Colony at Saldanha Bay by WAHLBERG it is no doubt to be regarded as a variety of the last mentioned species. The hoofs of this young female are also of the longish type exhibited by *R. campestris*, as they measure above 3,2 cm.

The late Dr. SUNDEVALL observed the bright colour of this specimen and made therefore the following remark about it when he entered it in the catalogue of the museum: »Est varietas *rufescens* rec.» With this remark he expressed his opinion

that it simply displayed a variation with regard to the colour and I think he was right in that.

But if such »*rufescens*»-varieties are produced by several different species, it is very uncertain, to say the least, to which species just that specimen belonged to which HAMILTON SMITH first attached the name »*rufescens*» if it is not explained by other characters or by the origin of the actual specimen. By this I have not denied that JENTINK's »*rufescens*» may be a very good species, I have only offered some doubts concerning the correctness of placing this name on it. Unfortunately the literature which I have been able to consult does not give any exact information about the locality whence HAMILTON SMITH's »*rufescens*» originated.

As has been alluded to above, JENTINK has said that it is uncertain to which antelope THUNBERG has given the specific name »*campestris*». JENTINK assumes that the type was lost, and he means that the description is too short to prove anything with certainty, as it is, according to his opinion, »applicable to several other species of Antelopes». This is, I think, to be too rigorous. Even if for instance the descriptive notes could be applied to some other species, as well, there is some other valuable information given by THUNBERG which makes this more than improbable viz. the quoting of the name »Steenbok», and the statement that the antelope in question lived near Capetown. These two facts appear to make every misunderstanding impossible even if the type had been lost. There is, however, a specimen of this kind still kept in the zoological museum of the R. University at Upsala, and it appears to have been there since THUNBERG's time. The label indicates that it is from the old »museum aademicum» and it was even believed once that it was from the time of LINNÆUS. This is however not true, but it is more probable that it is a member of THUNBERG's collection although it for some reason or the other has been omitted from his published list. In a by THUNBERG written catalogue of the animals of the Zool. Museum of the R. University at Upsala it is entered as »*Antilope grimmia?*» It is well known that THUNBERG to begin with erroneously used this Linnean specific name just for the species which he afterwards named *Antilope campestris*. In such a case I think that it is reasonable to assume this specimen still kept in Upsala as the type of THUNBERG's »*Antilope campestris*», and it is the more gratifying to do so as by such a proceeding nothing is altered in the nomenclature, but everything is in agreement with the general opinion among zoologists before JENTINK published the new name.

Some measurements of the Upsala specimen may be of interest and are therefore recorded.

Length of ear . . . . .	12,6 cm.
» » head . . . . .	15,3 »
» » horns . . . . .	7,3 »
» » hoofs of foreleg, above . . . . .	2,8—2,9cm.
Crown of the same . . . . .	1,8 cm.

The hoofs are accordingly of the longish type.



*Nesotragus moschatus* VON DÜBEN.

*Nesotragus moschatus* VON DÜBEN, Öfvers. Kgl. Sv. Vet. Akad. Förh. 1846.

*Kilimandjaro*: 1 ♂ specimen from the cultivated zone at Kibonoto <sup>30</sup>/<sub>8</sub> 1905 — 2 specimens (♂, ♀) from the same locality, Nov. 1905 — 1 (♂ juv.) specimen from the same locality Oct. 1905 has no horns, although the basicranial length of the skull is 87 mm.

The colour of the female is a little more grizzled fawn-grey and that of the bucks somewhat more rufous.

»Common on the steppe, where they seek shelter among the dense growth of bushes all the way up in the rain forest. The skin is an article of trade» (SJÖSTEDT).

*Cobus ellipsiprymnus* (OGILBY).

*Cobus ellipsiprymnus* (OGILBY). SCLATER & THOMAS, Book of Antelopes Vol. 2 p. 97.

*Meru*: 1 fine buck from the Hippopotamus lakes (Lake Merker) <sup>30</sup>/<sub>7</sub> 1905.

*Redunca bohor* RÜPPELL.

*Cervicapra bohor* (RÜPP.). SCLATER & THOMAS, Book of Antelopes II, p. 165.

*Kilimandjaro*: 1 young male without horns from the Natron lakes on the low lands between Meru and Kilimandjaro, <sup>11</sup>/<sub>9</sub> 1905 — 1 calf from the same locality <sup>2</sup>/<sub>10</sub> 1905 — 1 male and 1 female from the same locality <sup>9</sup>/<sub>12</sub> 1905, the latter was in a gravid state when shot. — 1 female from the same locality <sup>27</sup>/<sub>4</sub> 1906.

»Common at the Natron lakes between Kilimandjaro and Meru especially during the dry season, when they were found at every visit I made there. They lay hiding in the high grass at the shore in single specimens, or some few near each other, sometimes also in the bushes on the steppe near the lakes. They appeared to like as well the dense bulrushes (*Scirpus*). They lie close and very often do not break cover before the sportsman is quite near them. Towards evening they appear grazing on the open places near their cover.» (SJÖSTEDT).

*Apyceros melampus suara* (MATSCHIE).

(Pl. 3, fig. 2.)

*Apyceros suara* MATSCHIE, Säugethiere Ost-Afrikas, p. 129.

*Kilimandjaro*: 1 ♀ specimen (gravid) from Ngare nairobi, <sup>12</sup>/<sub>7</sub> 1905 — 1 ♂ specimen from the same locality <sup>10</sup>/<sub>8</sub> 1905 — 3 specimens (♂ ad. ♂ juv. with straight horns, ♀ gravid) from the same locality <sup>11</sup>/<sub>8</sub>, <sup>13</sup>/<sub>8</sub> 1905 — 1 female and 1 calf from Ngare nairobi, end of March 1906. — *Meru*: 2 young calves — 1 ♀ specimen from Ngare na Nyuki <sup>18</sup>/<sub>10</sub> 1905 — 1 ♂ juv.

I am uncertain whether this Pallah deserves to be counted as a separate subspecies as the characters are rather vague and the variability is great. The horns

are very variable and MATSCHIE has mentioned this himself saying: »Der Abstand der Spitzen ist bei den verschiedenen Exemplaren sehr verschieden, von 16—53 cm.»

The calves are paler, sandy brown but their blackish markings are well developed.

»The Pallah antelopes were common in the thin acacia-woods at Ngare na nyuki and on the more or less dense acacia-steppe at Ngare nairobi and on the surrounding steppe as far as spiny bushes grew among the grass. Above all, however, these beautiful animals lived in greater or smaller flocks in the open places between the groups of bayonet plants (*Sanseveria*) and low acacias in such places where acacias with wide crowns form thin woods.»

»When the animals suddenly get scared they jump as is well known in high bounding leaps in different directions before they make their final escape.»

»The 16th of January a herd of 30—40 animals was seen and among these was only a single buck with fine horns, the others were halfgrown youngs and does.»

»The female shot the 13 of Aug. had a big foetus in its uterus in another gravid female shot the 26th of March the foetus measured about 30 cm. in length.» (SJÖSTEDT).

#### *Gazella thomsoni* GÜNTHER.

*Gazella thomsoni* GÜNTHER. MATSCHIE, Säugethiere Ost-Afrikas, p. 130.

*Kilimandjaro*: 1 ♂ specimen from Ngare nairobi <sup>8</sup>/<sub>8</sub> 1905 — 3 specimens (♂, ♂, ♀) from the Kibonoto steppe resp. <sup>27</sup>/<sub>8</sub> and <sup>9</sup>/<sub>9</sub> 1905 — 1 ♂ specimen from the steppe at the river Kirarágua, Oct. 1905 — *Meru*: 2 specimens a buck and a quite young kid, from the steppe at Ngare na Nyuki <sup>17</sup>/<sub>10</sub> 1905. Prof. SJÖSTEDT has remarked about this little kid that it ran with very great speed in spite of its youth. — Another kid from the same locality <sup>28</sup>/<sub>10</sub> 1905.

The authors of the Book of Antelopes write about this species: »— — — a black patch present on the top of the muzzle.» In none of the specimens recorded above there is any »black patch» to be seen, but two specimens shew a faint dusky stripe on the place mentioned.

From these facts it might be concluded that there were two different varieties of *Gazella thomsoni*, one from the Kilimandjaro district without or with only faint traces of a dark spot on top of the muzzle, and another from a more northern district in British East Africa with a black patch on the place mentioned. The former must be the type, as GÜNTHER named the species on specimens from the Kilimandjaro district, and the one with the black patch should be provided with a trinomial name, if it really represented a geographical subspecies. To make sure about this I took the liberty of writing to my friend Mr. OLDFIELD THOMAS and asked him whether the specimens of *Gazella thomsoni* from British East Africa constantly possessed the black patch on top of the muzzle and if the material in Brit. Museum (Nat. Hist.) indicated that the characteristic mentioned was of subspecific name. In his kind reply Mr. THOMAS said that he could not with full certainty

decide upon the question whether the nasal spot was a good character or not, and he added that the spot is »strong in specimens from N. Uganda and Lado and it is therefore possibly a geographical character» — — — —. At that time, however, Mr. THOMAS did not like to speak quite positively about this question. Later on I had the pleasure of receiving a new communication from Mr. THOMAS in which he stated that the specimens of *Gazella thomsoni* from British East Africa always have the black nasal spot. In such a case I think that it is correct to regard this characteristic as denoting a geographic subspecies with a more northern distribution and with the distinguishing mark gradually better developed in the most remote parts of its area of distribution, viz. Northern Uganda and Lado which zoogeographically belong to another district than Kilimandjaro.

In consequence of this I think it is convenient to assign a third name to the variety with the black patch on the nose and it is therefore proposed here to call the northern variety of Thomson's Gazelle as figured in »The Book of Antelopes (Vol. II, Pl. LXVIII) *Gazella thomsoni nasalis*.

»The Thomson Gazelle was in some districts common, and lived usually in herds associated with the related Grant Gazelle from which, however, it was easily distinguished already at a distance by its sharply defined, broad black lateral band and its smaller size. These Gazelles were most numerous at Ngare na nyuki, Ngare Nairobi (Pl. 4, fig. 1), and Kiraragua. Small calves started and seared on the steppe run with exceedingly great speed» (SJÖSTEDT).

#### *Gazella granti* BROOKE.

*Gazella granti* BROOKE, SCLATER & THOMAS, Book of Antelopes III, p. 179.

*Usambara*: 1 young kid from Same <sup>27</sup>/<sub>6</sub> 1905 — *Kilimandjaro*: 1 ♂ specimen from the steppe at Ngare Nairobi <sup>14</sup>/<sub>8</sub> 1905 — 1 young specimen from the same locality <sup>16</sup>/<sub>8</sub> 1905 — 2 specimens (♂, ♀) from the Kibonoto steppe at the river Kiraragua <sup>21</sup>/<sub>9</sub> 1905 — 4 specimens (♂, ♀, ♀, juv.) from the same locality Oct. 1905 — 1 ♂ specimen from the Kibonoto steppe <sup>27</sup>/<sub>10</sub> 1905 — 1 specimen without label. — »Meru, Ngare na nyuki, very common».

The young kid differs in colour considerably from the adult animals. The general colour is sandy, more yellow on the neck, more grey on the back, finely mixed with black everywhere because many hairs have black tips. Along the middle of the back these black tips are more numerous so that an indistinct dark band is formed. A light lateral band is conspicuous, pale sandy. Below the same the dark band is found but its blackish ground colour is mixed with sandy in consequence of broad subterminal whitish rings to the hairs. Some hairs have only black tips and are otherwise sandy whitish. The dark lateral band is thus not sharply defined. The lower parts are white. A black pygal band is present but the white of the hams is not so broad at the tail as in the adult. The crown of the head is grizzly grey with a black patch in the middle. The forehead yellowish brown. A black spot on



top of the muzzle. A whitish band from the upper eyelid to the side of the muzzle. A black spot above the eye extends over the eye as a dark band below the just mentioned whitish one. Behind the eye, above and below, this blackish band is bordered by a large whitish patch. The pattern of the adult is thus present, although the colours are not so bright.

In this respect this species differs from *Gazella thomsoni* the kids of which have the same colour as the adult.

The spreading of the horns of the adult varies a great deal independently of age. In one of the oldest bucks the distance between the tips is only 25 cm., in another 35 cm., and in a third 43 cm.

For the knowledge about the propagation and growth of this species the following notes may be of some value: the 29th of Dec. an uterine foetus was found in a female, a quite small calf was taken at Same in Usambara at the end of June, and the first days of Oct. young specimens were found with the horns 10 cm. in length and curved forward.

»The Grant Gazelle is the most common antelope in this district and it is the most beautiful representative of the steppe fauna. It lives always in smaller or greater herds — sometimes containing hundreds of heads — often in company with Thomson Gazelles as well as with Kongoni antelopes, Gnus and Zebras at Ngare nairobi, Ngare na nyuki (Pl. IV, fig. 1) and Kirarágua, but at other places as well. No antelopes of any kind were, however, seen in the district at the western and northwestern side of the Meru mountain, although wide grass steppes extended there. On the northwestern side of Kilimandjaro again they were very common and not shy as they seldom were disturbed by men there. The herds of Gazelles consisted there only of the present species, seldom any Thomson Gazelles were seen among them.»

»The 27th of March a great herd of Gazelles was seen on the steppe at Ngare nairobi. It consisted only of half grown animals and their mothers. In their sandy yellowish coat they have a great resemblance to the often yellowish surroundings and in a certain light and at some distance they sometimes might become unnoticed if they did not show against the horizon. As worthy guards of the herd the old bucks are least shy and they are often seen wandering by themselves at some distance from the others. They are the last to run away when some danger threatens, while the does and still more the kids in a great hurry speed off the latter with elastic leaps and tail erect, bounding like rubber balls scare the whole herd to flight through their liveliness. The bucks swing their tails uneasily and walk leisurely away, heroically covering the retreat. Then at once when the others have got away the bucks speed away, but stop perhaps soon again and resume their walk. Wounded bucks are not readily abandoned by the herd. The animals stop often in their flight and look back at their leader; a certain uneasiness appears to have got hold of them all» (SJÖSTEDT).

»The Gazelles that live in the acacia forests eat leaves, pods and pease of the acacias as an examination of their ventricle proves.»

»Among the herds of big game on the steppe the Crowned Lapwing (*Stephanyx coronatus*) is often seen. It is the most reliable guard for the antelopes. On the way to Kirarágua I made the following notes: We had hardly entered on the real grass steppe before we flushed some Crowned Lapwings which with irritating screams and with light but powerful wing-strokes tumble round in the air. Their black, white and yellowish brown plumage make their appearance in the air quite striking but when they sit down and fold the whitish glistening wings they disappear at once among the yellowish dry grass. This Lapwing is the most dreaded foe of the hunter when he, on the steppe, stalks his wary prey. Cautiously he approaches the animals, his steps get slower, his eyes follow every movement of the prey, and he has a strong hope that he may reach near enough to shoot. Suddenly some Lapwings rise from the burnt ground, in rapid flight they speed forward, rise in the air, tumbling hither and thither, screaming and crying in the most penetrating way. This is the signal of alarm for the wary animals of the steppe! The grazing Grant Gazelles raise their heads, prick up the ears and swing the tails in an uneasy manner. Some of them wheel round and then at once the whole herd runs off over the vast steppe. Gnus and Zebras follow soon, often pursued by the birds which screaming fling themselves like furious among the running animals not becoming quiet before their protégés have safely disappeared» (SJÖSTEDT).

»In the later part of Oct. the Gazelles were sometimes much infested by larvæ of *Hypoderma* under the skin of the back. Even 30 to 40 such larvæ could be counted in animals killed at that time» (SJÖSTEDT).

### *Oryx callotis* THOMAS.

(Pl. 3, fig. 3.)

*Oryx callotis* THOMAS. SCLATER & THOMAS, Book of Antelopes, IV, p. 73.

*Meru*: 1 ♂ specimen and the skull of another from Ngare na nyuki, March 1906.

»This *Oryx* is the wariest of all the antelopes of the steppe. It was not rare and occurred sometimes in rather big herds at Ngare na nyuki. Sometimes single specimens which were exceedingly shy, were seen on the steppe or in thin acacia woods. It is very difficult to stalk and hard to kill, the very thick skin affording good protection» (SJÖSTEDT).

### *Tragelaphus sylvaticus meruensis* n. subsp.

Several specimens of Bushbuck have been collected by Prof. SJÖSTEDT and in consequence of their difference inter se they are described each separately.

a) 1 buck from the *Meru* steppe,  $\frac{6}{3}$  1906.

This is the only adult buck of *Tragelaphus* in the collection. It agrees in general perhaps best with the coloured plate of *Tragelaphus sylvaticus* (!) in the »Book of Antelopes» although it has a darker and more reddish tint on the body and less white on the legs and in the crest. A striking resemblance to the Cape Bushbuck is the absence of stripes on the body and, perhaps still more important, the absence of a white spot in front of the eye, although the two whitish spots are present on the cheek. The general colour is dark reddish brown on the back and hind quarters, passing into dark smoky brown on the shoulders and sides of the breast; below dark smoky brownish grey with a white patch at the bases of the legs on their inner side. The crest of the back not strongly developed, with the long hairs yellowish white. Forelegs with a blackish brown stripe in front, buffish on the inner side shading to white below, brown on the outer side. A white spot above the hoofs surrounded by blackish brown. Hindlegs smoky brown at the base below the hams, a white or yellowish white stripe on the inner side. A short blackish brown stripe at the lower end of the cannon bone just above the white patch above the hoofs, otherwise the hind legs are rufous brown. Tail rufous above, white below. Hairs of the neck worn off. Face rufous, blackish brown on top of the nose.

b) 1 quite young buck still without horns (and with the first molar not yet cut) caught between *Kilimandjaro* and *Meru*  $\frac{4}{3}$  1906 is very dark above. It is even darker on the back than the old buck is below and may be termed smoky chestnut brown. The flanks from the chest to the hams as well as the lower parts are bright rufous. There is one very faintly developed transversal white stripe, and behind this one about seven small white spots on the hindquarters but each such spot is formed by quite a small number of hairs. A few of the hairs along the mesial line of the back are white-tipped, foreboding a white crest in the mature age. Feet and head coloured as in the adult buck. This young buck has not the hairs on the base of the neck shorter than elsewhere, but this is no doubt due to its youth.

c) 1 female Bushbuck from the mixed forest at Kibonoto, *Kilimandjaro*  $\frac{31}{12}$  1905. This is the darkest of the females and is not yet fullgrown. Its back is chestnut, still darker anteriorly above the shoulders. The flanks and hams are bright rufous, the lower parts buffish white. On the right side three transversal stripes may be traced by scattered white hairs, but on the left only two. A number of white spots form a longitudinal series (corresponding to a lower longitudinal stripe), and in addition to this about half a dozen white spots are scattered over the hindquarters. The neck is dark greyish brown with very short hair, especially at the base. The forehead is dark rufous or chestnut with a dark spot on the nose, the sides of the head are paler rufous with two white spots on the cheeks but none in front of the eye.

d) The specimen next in colour is a fullgrown female from the mixed forest at *Kilimandjaro*: Kibonoto  $\frac{6}{12}$  1905. When killed it was gravid.<sup>1</sup> It is not quite so

<sup>1</sup> It looks on the skin as if the specimen should have had 6 teats!



dark as the foregoing but must be said to be chestnut all over the back becoming rufous on the flanks and fading almost to buff below. There are only a few scattered white spots on the hindquarters two of which at the groin are better visible than the others. There is no trace of any stripes and no white spot in front of the eye.

e) 1 young buck still possessing the milk-molars and with only the first permanent molar cut, shot in Nov. 1905 at *Kilimandjaro*, Kibonoto, is still paler and somewhat more spotted. Its general colour is rufous with the neck and the back above the shoulders smoky brown. The hair at the base of the neck is short. On one side may be counted 7 on the other 10 white spots. Two faint transversal stripes may be traced. No horns are developed and not even visible on the skull.

f) 1 young female from *Kilimandjaro*, Kibonoto, <sup>15</sup>/<sub>7</sub> 1905 in about the same stage of development or perhaps a little older and with the second molar just coming, is rufous with numerous white spots on the hindquarters and three transversal stripes on either side. These stripes are very faintly developed and only to be traced by single hairs. The hair at the base of the neck is just beginning to become short. No white spot in front of the eye.

g) 1 somewhat older female from the Natron lakes, *Kilimandjaro—Meru*, Nov. 1905 with the second molar in use but with the third not yet cut has still more white markings. The white spots on the hindquarters are numerous. A longitudinal series of strongly developed spots runs along the lower portion of the sides above the belly. Half a dozen transversal white stripes are more or less developed. The hair all over the neck is very short. The general colour of the body is rufous a little brighter than e) and f).

There is thus not two specimens fully alike in the whole lot. The differences are not to be interpreted as due only to age or sex. The only thing that plainly stands in connection with the age is the condition of the hair on the neck. It is always shorter and »worn off» on a greater area of the neck in an older individual than in a younger. One negative characteristic all these specimens have in common and that is the absence of the white spot in the face in front of the eye which is to be seen on the plate of *Tragelaphus roualeyni* in the »Book of Antelopes», but all of them have the two round white spots on the cheeks. Otherwise as well the general colour as the markings are variable.

The Bushbuck of German East Africa has generally been regarded as *Tragelaphus roualeyni* by most authors. NEUMANN created the name *Tr. massaicus*<sup>1</sup> for the Bushbuck of »German and British East Africa» and described the type from »upper Bubu, Northwestern Irangi.» This description indicates, however, a quite different-looking animal. The buck is said to have »mehrere weisse Flecke an den Wangen», and in addition to this, »je ein weisser Fleck am Nasenrücken». To be an old buck it has rather many white markings on the body, too. »Weisser Rücken-kamm von dem jederseits vier mehr oder weniger deutliche Querstreifen herabgehen. Zahlreiche weisse, deutlich ausgeprägte Flecke auf den Hinterkeulen. Auch jederseits

<sup>1</sup> Sitzber. Ges. Naturf. Freunde, Berlin. 1902, p. 96.

ein oder zwei schwächere weisse Flecke auf den Vorderkeulen.» The name *massaicus* cannot on this account be put in connection with these specimens.

The authors of the »Book of Antelopes» point out the great variability of the Bushbucks of East Africa which they term *Tragelaphus roualeyni*. There is a great need of more material before the question concerning the different varieties of this animal can be fully solved, whether there are several geographic races or only individual varieties. The material at hand is not sufficient, especially because most of the specimens are too young. It may, however, be possible that specimens *a*, *b*, *c* and *d* represent a somewhat darker, chestnut, race with fewer white markings and no transversal stripes in the adult. Specimens *e* and *f* are somewhat lighter but may nevertheless belong to the same series. Specimen *g* is more doubtful it might represent a lighter more rufous race with more numerous white spots and several transverse stripes more or less developed. It agrees on the whole with the description of the female of NEUMANN's *Tragelaphus dama* from Kavirondo at the eastern side of Victoria Nyanza. NEUMANN's *dama* has not, however, any vertical stripes (»Keine weissen Horizontal- oder Vertical-Striche», l. c. p. 97). If *T. dama* really is a constant race it is quite possible that this rufous Bush buck from *Meru* is an allied variety.

The darker specimens cannot be counted to the same, nor can they for reasons stated above be referred to the race which NEUMANN called *massaicus*. It is possible that they might be included into the compound of different geographic forms which has been termed with a common name *Tragelaphus roualeyni*. They belong, however, certainly not to the same race as that which originally was named so, even if it is difficult to determine which Bushbuck rightly may carry that name. It is most probable as NEUMANN has hinted (l. c. p. 98) that there are still several forms of Bushbucks to be described from different parts of Africa, even if I cannot agree with him when he calls such forms »Arten» nor when he expresses his disbelief in the »Variation in der Art unter sich». On the contrary I believe that the variation is rather great among the Bushbucks. But I think that this variation has been centralized so to say in certain districts so that within certain geographical limits more or less distinct subspecies have been developed. Such geographic subspecies are now known in great numbers among some animals but are fewer in other groups. I think that the genus *Tragelaphus*<sup>1</sup> belongs to the former category and that NEUMANN's quoted *T. massaicus* is such a geographic race which has its home in Irangi and surrounding districts. Another geographic subspecies of corresponding nature I regard to be represented by the dark specimens described above. Although our knowledge at present concerning the Bushbucks is not sufficient to prove anything with full certainty it appears to me to be the correctest way to place this Bushbuck from the Meru-Kilimandjaro district as a subspecies under *Tragelaphus sylvaticus* SPARRMAN and it is thus proposed to call it *Tragelaphus sylvaticus meruensis*. The specimen *a* described above may be regarded as the type for the male and the specimen *d* as the type for the female of this geographic subspecies.

<sup>1</sup> Concerning the different forms of *Tragelaphus* see NEUMANN l. c. and LÖNNBERG On the Harnessed Antelopes of the Cameron territory etc. Ark. f. zool. Bd 2. 1905.



The habits of the Bushbucks appear to rather similar all over Africa. They like bushy and wooded districts which are interrupted by open grassy places but they do not come out on the great plains or steppes and are seldom found far from water. This mode of living makes them rather local in their habits and isolates them within certain boundaries and by this the originating of new races is facilitated.

Professor SJÖSTEDT writes about the Bushbucks in the Kilimandjaro-Meru district: »In the surroundings of the mountains this antelope was common in certain localities especially in districts which were partly wooded partly open, where greater or smaller open places extended between woods with a dense growth of bushes or some other kinds of forests or bush. On these open glades the Bushbucks were sometimes taken by surprise when they were grazing. They tried then always with greatest possible speed to find shelter in the adjacent protecting bush. As a rule they were found single or some few near each other, never in herds, and not readily far from water.»

»The old buck shot the 6th of March 1906 had in the ventricle a lot of yellow apple-like fruits of a spiny Solanacee, common in this district. (It was also infested by nematodes and plathelminths.)»

#### »*Strepsiceros imberbis* BLYTH

was seen a couple of times at Ngare na nyuki, *Meru*, where a buck was shot and badly wounded <sup>20</sup>/<sub>10</sub> 1905 but could not be overtaken, although it was long pursued. This antelope lived here partly on the grass steppe with scattered acacias partly in the denser acacia forest at the river» (SJÖSTEDT).

#### *Taurotragus oryx livingstonii* (SCLATER).

(Pl. 2, fig. 1 & 2.)

*Taurotragus oryx livingstonii* SCLATER & THOMAS, Book of Antelopes IV, p. 197.

Professor SJÖSTEDT did not obtain any specimen of Eland Antelope except a young calf which was caught by the Massais on the steppe the 17th of July 1905 and then kept in confinement for some time. This young Eland is represented in two different stages of its development, on Pl. 2, figs. 1 and 2, as newborn and at an age of about 8 months old.

A small herd was seen on the steppe at Ngare na nyuki in Nov. 1905 in the same locality where the calf had been caught some months before.

»The Elands live not only on the steppe but occur on the upper mountain meadows as well, where small herds were seen by HANS MEYER at an altitude of 4400 m. on the vegetation-less saddle plateau between the peaks. Parts of skeletons were seen at an altitude of 4500 m. near the glacière of South Kibo and quite fresh tracks at West-Mawenzi at an altitude of 47000 as far as single tufts of grass or plants were to be seen.»



## Tubulidentata.

### *Orycteropus* sp.

»In many places especially in the territory adjacent to Ngare nairobi and Ngare na nyuki burrows made by these animals were seen often in great number scattered over the steppe. Even on the mountain in the upper cultivated zone freshly made burrows of this were observed» (SJÖSTEDT).

### Supplementary notes on the East African Warthog.

It has been stated above (p. 34) that the present collection does not contain sufficient material of adult Warthogs to decide with full certainty, whether the Warthog of the Kili-mandjaro-Meru district represents a separate geographic subspecies or not. It might, however, be of same value to point out the differences by which, as far as the available material allows, it appears to be separated from other East- and South African Warthogs.

The oldest specific name which has been given to any animal of this genus is »*aethiopicus*» published by PALLAS 1767 in »*Spicilegia Zoologica*» Fasc. II and this name was accepted by LINNÆUS in a supplement to the twelfth edition of »*Systema Naturæ*» 1768. The type specimen for this name had been carried to Europe by a Dutch vessel from Cape of Good Hope and was then kept in »*Vivario Sereniss. Principis Auriaci*».

The second specific name in use was »*africanus*» established by GMELIN 1788. »The type-locality for the Warthog with this name was indicated as «Africa a capiti viridi ad caput bonæ spei», thus originally Senegal, as in the first rank PENNANT and BUFFON are quoted and both these authors speak about the »Sanglier de cap verd».

By FR. CUVIER 1817 the specific distinction between these two Warthogs was made better known. He pointed out that *Phacochærus aethiopicus* had no incisors but *Ph. africanus* was provided with such, 2 in the upper, and 6 in the lower jaw, as was already mentioned by BUFFON and PENNANT. From that time two species of Warthogs have been generally recognized by zoologists, although, for instance, GRAY (1869) did not admit but one species. There has, however, been given quite a number of names which mostly already by the original authors have been regarded as mere synonymes, although more »suitable».

*Phacochærus aethiopicus* from Cape of Good Hope was thus named *Ph. edentatus* by IS. GEOFFROY ST. HILAIRE<sup>1</sup> 1828, *Ph. Pallasii* by VAN DER HOEVEN<sup>2</sup> 1839 etc. The same West African Warthog from Cape Verde or Senegal which originally had been named *Ph. africanus* was called *Ph. incisivus* by IS. GEOFFROY ST. HILAIRE<sup>1</sup> 1828. When CRETZSCHMAR 1826 described the mammals collected by RÜPPELL in Abyssinia and Kordofan he believed that the Warthog from that country was identical with the one previously named »*africanus*», nevertheless he altered the

<sup>1</sup> Dict. d'hist. nat. p. 320.

<sup>2</sup> Nov. Act. Acad. Leop. Carol.

name because he did not like geographic names. He named then the Abyssinian Warthog *Ph. Æliani* because he regarded it to represent the »ὄς τετρακέφως» mentioned by that old author. Although CRETZSCHMAR believed himself that his *Ph. Æliani* was identical with *Ph. africanus* from Senegal it must be kept in mind that the type for the former name was an Abyssinian animal.

Only two years later EHRENBERG named a Warthog from Arkiko in the present Eritrea, *Ph. Haroia*. EHRENBERG expressed as his opinion that the Abyssinian Warthog was not identical with the animal from Senegal which originally had received the name *Ph. africanus*. It is also questionable whether *Ph. æliani* and *Ph. haroia* are fully identical as the coloured figures published by CRETZSCHMAR and EHRENBERG differ in several respects.

In the year 1846 SUNDEVALL stated that the Warthogs sent home from »Caffraria», that is Natal, by WAHLBERG were provided with incisors in both jaws and thus belonged to »*Ph. æliani*» (not to *Ph. æthiopicus*). PETERS again named 1852 the specimens from Mossambique *Ph. africanus*.

In such a way later authors have sometimes used the name *æliani*, sometimes, and more often *africanus* but both have been used in the same broad sense comprising all Warthogs with upper and lower incisors from all parts of Africa.

In the year 1900 W. L. SCLATER<sup>1</sup> »included all the South African wart-hogs under the oldest name *P. æthiopicus*», although his material comprised skulls as well with as without incisors in the upper jaw.

This might suffice to prove that a great uncertainty prevails concerning these animals. As I have comparatively little material to base my judgement on, it is with hesitation that I express my views in the following, but I think that they may serve to set matters aright to some extent. It appears that more than two kinds of Warthogs must be discerned and distinguished by names viz for the present at least:

<i>Phacochoerus æthiopicus</i> (PALLAS)	type-locality	Cape.
» <i>africanus</i> (GMELIN)	»	Cape Verd.
» <i>sunderallii</i> n. n.	»	Natal.
» <i>massaicus</i> n. n.	»	Kilimandjaro-Meru district.
» <i>æliani</i> <sup>2</sup> CRETZSCHMAR	»	Abyssinia.

These appear all of them at least according to the material available to me and according to the literature to be easily distinguished by cranial characteristics, especially is this the case with the adult boars, but on the other hand at least the three last are to be regarded as geographic subspecies. *Phacochoerus æthiopicus* is the most specialised Warthog in which the upper incisors have completely disappeared and usually the lower ones as well, although the latter perhaps may be present in young specimens in a rudimentary stage. In addition to this the skull of *Ph. æthiopicus* is recognized on its relative shortness, especially with regard to its post-

<sup>1</sup> The Fauna of South Africa p. 278.

<sup>2</sup> Whether *Ph. haroia* is distinct must be left to the future. If it is, its type-locality is Arkoki, Eritrea.

orbital portion. A typical skull of an old boar which has been brought home by SPARRMAN measures from the tip of the nasals to the sagittal crest 366 mm., but the breadth between the middle of the orbits is 134 mm. The latter measurement is thus contained about 2,7 times in the former. The postorbital portion of the skull is only 38 mm.<sup>1</sup> and the width of the flat postorbital area is about 49 mm. The postorbital length of the skull is thus only about 10 % of the total length.

The nasals are anteriorly rather evenly convex, but form in their posterior portion behind *foramina infraorbitalia* a rooflike ridge or elevation.

The palatal opening or the choanæ are much broader than in related forms so that their width in the middle (midway between *hamuli pteryg.* and *bullæ*) is 40 mm. The osseous septum is also much better developed and divides two very deep but fully open posterior pockets.

The lower jaw is very broad anteriorly, and several other minor characteristics could be enumerated but those mentioned may suffice to prove that *Ph. æthiopicus* really must be maintained as a species.

This species appears to be exterminated in the Cape Colony south of the Orange River according to W. L. SCLATER (l. c. p. 280) but the same author says that a skull of a Warthog from Damaraland has no incisors, and therefore *Ph. æthiopicus* may survive there, or perhaps is the Damara Warthog a separate subspecies of and closely related to *Ph. æthiopicus*.

The Warthog of Natal I propose to distinguish with the name *sundervallii* as C. J. SUNDEVALL was the first to point out its distinctness from *Ph. æthiopicus*. The Warthog from German East Africa I propose to name at least provisionally *Ph. massaicus*. Both these races are provided with two upper and six, or at least four lower incisors. By this and by their longer skulls, with longer postorbital portion, differently shaped nasals and choanæ they are easily distinguished from *Ph. æthiopicus*.

The skulls of the boars of *sundervallii* and *massaicus* are also easy to distinguish from each other at least as far as my material goes. *Ph. massaicus* has a much (as well absolutely as comparatively) broader forehead so that the interorbital width is contained only about 2 1/2 times in the length of the skull (from tip of nasals to sagittal crest) while the former measurement is contained fully 3 times in the latter in *Ph. sundervallii*. The postorbital portion of the skull is comparatively shorter and narrower in *Ph. sundervallii* so that its length represents about 13 % of the total cranial length measured as above, while the same relation is about 14,4 % in *Ph. massaicus*. In the latter the flat postorbital area is fully as broad as long but in *Ph. sundervallii* the width is about 4/5 of the length.

The nasals of *Ph. sundervallii* are anteriorly somewhat convex in the middle, and slightly concave on the sides, but in their posterior portion, behind *foramen infraorbitale*, they are quite flat or somewhat concave, only with a slightly raised

<sup>1</sup> Measured in the median line to the sagittal crest vertically to a plan through the posterior surface of the orbital wall.



line along the median suture. The nasals of *Ph. massaicus* are evenly convex along their whole extent only with the lateral portions flattened in the anterior half.

The choanæ of *Ph. sundevallii* are very narrow, only 30 mm., those of *Ph. massaicus* decidedly broader 37 mm. without, however, attaining the width of *Ph. athiopicus*. The osseous septum is not so high as in the last mentioned species, but both in *sundevallii* and *massaicus* the posterior pockets mentioned above are covered by a bony lamella extending about 2 cm. in front of *basioccipitale*.

The female skulls are more similar to each other, than those of the males, but the postorbital flat area is broader in the female *Ph. massaicus*. Thus in two female skulls of the same length, 367 mm. from the anterior tip of the nasals to the sagittal crest, the width of the postorbital flat area is in *Ph. sundevallii* only 30 mm. but in *Ph. massaicus* 39 mm. In the same way the choanæ are broader in the latter than in the former. *Phacocharus æliani* appears to have according to CRETZSCHMAR's figures a more elongated skull even than *Ph. massaicus*. The postorbital portion (measured on the figures as indicated above) is about 14 % of the total length of the skull, thus a trifle shorter than in *Ph. massaicus*, but on the other hand the interorbital breadth of *Ph. æliani* is comparatively very much smaller than in *Ph. massaicus* so that the skull of the the Abyssinian Warthog looks very much narrower than the other. The interorbital width of *Ph. æliani* is, according to CRETZSCHMAR's figures (l. c. Tab. 26, *b*) contained not less than about  $3\frac{3}{4}$  times in the length of the skull. If the drawings are correct in CRETZSCHMAR's work these relative proportions are sufficient to easily distinguish *Ph. æliani* from the more southern Warthogs of East Africa. On the same condition another very conspicuous characteristic may be added. In CRETZSCHMAR's quoted figures, *a* and *b*, the distance from the anterior border of *foramen infraorbitale* to the anterior tip of the nasals is equal to the distance from the first mentioned place to *foramen lacrymale*, but as well in *Ph. sundevallii* as in *Ph. massaicus* the latter distance is much longer, resp. 4 and  $4\frac{1}{2}$  cm. in adult males. (In *Ph. athiopicus* the difference between these distances is not so great, about 1 cm.)

As I have no skulls of adult boars from Senegal I cannot extend the comparison to the Warthogs of the true *Ph. africanus* type. GRAY<sup>1</sup> says, however, about »the skull from Cap Verde» that »the line along the upper surface of the skull» is »full three times the length of the width between the upper edges of the orbits». It should thus in this respect perhaps be most similar to *Ph. sundevallii*. There are, however, no doubt distinguishing characters between these two Warthogs, although I cannot point them out with full certainty now for want of material. CUVIER's drawings<sup>2</sup> do not appear to be so carefully made that any conclusions can be based on them for this purpose.

In making these comparisons only adult skulls or figures of such have been used, which is a necessary precaution as the skulls of the Warthogs change a great

<sup>1</sup> Catal. Carniv. Pachyderm. 1869.

<sup>2</sup> Mém. du Mus. Paris T. VIII 1822.

deal during the growth of the animal, those of the young being comparatively narrower and less diverging from the common suine type.

In addition to the cranial differences there are characteristics to be found in the exterior of the animals, in their colour and the more or less rich development of the hairs, the shape of the ears etc. but for the present these cannot be considered. The sketch given above is therefore very incomplete, but I hope to be able at another opportunity to give a better account about the different races of Warthogs.

### List of Mammals hitherto recorded from the Kilimandjaro-Meru district.

#### Primates.

1. *Colobus caudatus* THOMAS.
2. *Cercopithecus albogularis kibonotensis* LÖNNBERG  
n. subsp. \*
3. » *pygerythrus johnstoni* Pocock.
4. *Papio neumanni* MATSCHIE.
5. » *ibeanus* THOMAS subsp.?
6. *Galago panganiensis* (MATSCHIE).

#### Chiroptera.

7. *Epomophorus neumanni* MATSCHIE.
8. *Rousettus lanosus* THOMAS.
9. *Rhinolophus augur zambesiensis* ANDERSEN.
10. *Lavia frons frons* (GEOFFROY).
11. *Cardioderma cor* PETERS (fide ABBOTT).
12. *Nycteris thebaica* GEOFFROY.
13. *Vespertilio nanus* PETERS.

#### Insectivora.

14. *Crocidura fischeri* PAGENSTECHER.
15. » *hirta* (PETERS).
16. » *fumosa* THOMAS.
17. » *maurisei* THOMAS.

#### Carnivora.

18. *Mellivora ratel* (SPARRMAN).
19. *Canis variegatus* CRETZSCHMAR.
20. » *mesomelas* SCHREBER (subsp.?).
21. » *adustus* SUNDEVALL »
22. *Otocyon megalotis* DESMAREST (fide ABBOTT).
23. *Lycan pictus venatus* THOMAS?
24. *Crocotta kibonotensis* LÖNNBERG, n. sp.
25. » *panganensis* LÖNNBERG, n. sp.
26. *Hyena schillingsi* MATSCHIE.
27. *Viverra civetta orientalis* MATSCHIE.

28. *Genetta suahelica* MATSCHIE.
29. *Nandinia gerrardi* THOMAS.
30. *Mungos cafer* (GMELIN).
31. » *sanguineus ibea* WROUGHTON.
32. » *galera robusta* (GRAY).
33. *Helogale undulata* PETERS (fide FISCHER, ABBOTT).
34. » *Crossarchus fasciatus* DESMAREST » (fide ABBOTT).
35. *Felis leo sabakiensis* LÖNNBERG, n. subsp.
36. » *pardus nimr* EHRENBURG.
37. » *oreata* (subsp.?) GMELIN.
38. » (*Zibethilurus*) *seval* SCHREBER.
39. *Cynalurus guttatus* HERRMANN.

#### Rodentia.

40. *Heliosciurus undulatus* TRUE.
41. *Funisciurus ganana* RHOADS.
42. » *Sciurus cepapi* A. SMITH » (fide ABBOTT, NEUMANN).
- 42 a. » » var. *aruscensis* » PAGENSTECHER (fide FISCHER).
43. » *mutabilis* PETERS (fide NEUMANN).
44. *Xerus rutilus* (CRETZSCHMAR).
45. *Graphiurus parvus* (TRUE).
46. » *mirinus* DESMAREST.
47. *Tatera mombasa* WROUGHTON.
48. *Mus hildebrandti* PETERS.
49. » *jacksoni* DE WINTON.
50. » *hindei* THOMAS.
51. » *Mus natalensis* A. SMITH » (fide ABBOTT).
52. *Leggada minutoides* A. SMITH.
53. *Thamnomys dolichurus* (SMUTS).
54. *Lophuromys aquilus* (TRUE).
55. *Arvicanthi pulchellus* (GRAY).
56. » *pumilio* SPARRMAN (fide VOLKENS).
57. » *neumanni* (MATSCHIE).

58. *Pelomys fallax* PETERS.  
 59. *Dendromys nigrifrons* (TRUE) (fide ABBOTT).  
 60. *Otomys irroratus* BRANTS (fide ABBOTT).  
 61. *Tachyoryctes splendens ibeanus* THOMAS.  
 62. *Myoscalops argenteo-cinereus* (PETERS).  
 63. *Hystrix galeata* THOMAS.  
 64. » *ambigua* LÖNNBERG n. subsp.  
 65. *Lepus* sp.  
 65a. *ochropus* WAGNER (fide ABBOTT).

### Hyracoidea.

66. *Dendrohyrax validus* TRUE.

### Proboscidea.

67. *Elephas* sp.

### Perissodactyla.

68. *Diceros bicornis* (LINNÉ).  
 69. *Equus chapmani böhmii* (MATSCHIE).

### Artiodactyla.

70. *Potamocheirus choceropotamus demonis* FORSYTH  
 MAJOR.  
 71. *Phacochærus eliani massaicus* LÖNNBERG n. subsp.  
 72. *Hippopotamus amphibius* LINNÉ.  
 73. *Giraffa tippelskirchi* MATSCHIE.

74. *Bubalis cokei* (GÜNTHER).  
 75. *Connochætes albojubatus* THOMAS.  
 76. *taurinus* BURCHELL (fide FISCHER).  
 77. *Cephalophus abyssinicus* THOMAS.  
 78. *harveyi* THOMAS (fide ABBOTT, FISCHER).  
 79. *spadix* TRUE (fide ABBOTT).  
 80. *Rhaphiceros neumanni stigmatus* LÖNNBERG n.  
 subsp.  
 81. *Nesotragus moschatus* VON DÜBEN.  
 82. *Madoqua kirki* GÜNTHER (fide ABBOTT).  
 83. *Cobus ellipsiprymnus* (OGILBY).  
 84. *Redunca bohor* RÜPPELL.  
 85. *Epyceros mclampus suara* (MATSCHIE).  
 86. *Gazella thomsoni* GÜNTHER.  
 87. *granti* BROOKE.  
 88. *Lithocranius walleri* (BROOKE) (fide HUNTER).  
 89. *Oryx callotis* THOMAS.  
 90. *Strepsiceros strepsiceros* (PALLAS) (fide JOHNSTON).  
 91. *imberbis* BLYTH.  
 92. *Tragelaphus sylvaticus meruensis* LÖNNBERG n. subsp.  
 93. *Taurotragus oryx livingstoni* (SCLATER).  
 94. *»Buffelus caffer SPARRMAN»* (fide ABBOTT).

### Tubulidentata.

95. *Orycteropus* sp.



PLATE 1.

**Plate 1.**

- Fig. 1. View from the steppe with scattered acacias. Hurrying down from the hill where the Giraffe (*Giraffa tippelskirchi* ♀) had been shot Prof. SJÖSTEDT managed to get this photo just before the animal collapsed. The starlike spots are plainly visible.
2. View from the grass steppe at western Leitokitok, NW. of Kilimandjaro. At some distance scattered acacias are seen. The Giraffe is a big bull of *G. tippelskirchi* with the spots not quite so jagged as those of the female.
- » 3. A young Serval from Kilimandjaro.
- » 4. New born Kongoni calf (*Bubalis cokei*) from the grass steppe at the river Kirarágua, western side of Kilimandjaro.



Yngve Sjöstedt foto.

Ljustr. Justus Cederquist, Sthlm



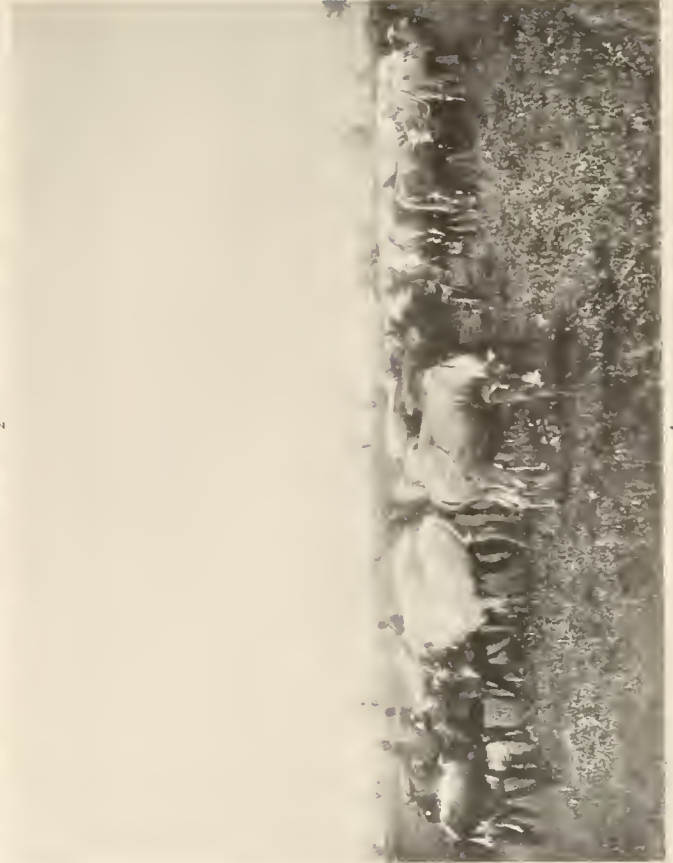
PLATE 2.

**Plate 2.**

- Fig. 1. Almost newborn calf of *Taurotragus oryx livingstonii* from Ngare na nyuki, 17/7 1905.
2. The same animal about 8 months later.
3. Herds of sheep and goats belonging to the Massais in the mixed forest below the south-western part of Kilimandjaro. Great acacias and other scattered trees and bushes.
4. Herds of zebu cattle belonging to the Massais, on the steppe between Kilimandjaro and Meru.
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Yngve Sjöstedt foto.

Ljustr. Justus Cederquist, Sthlm.



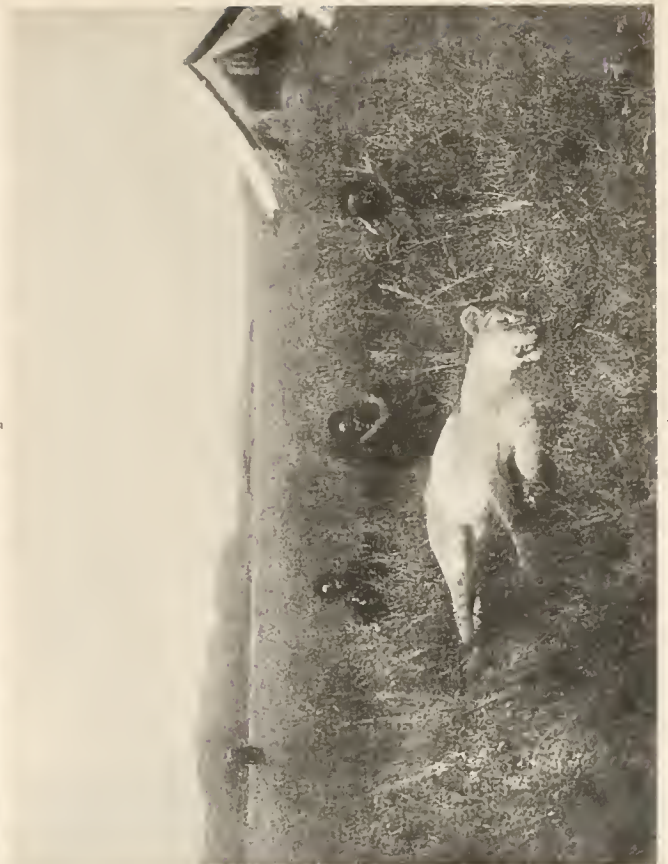
PLATE 3.

**Plate 3.**

- Fig. 1. A killed boar of *Phacochoerus* on the steppe at Ngare na nyuki, in the background scattered »umbrella acacias».
- » 2. An open place covered with meter long grass in the thin acacia woods at Ngare na nyuki, the favourite haunts of the Pallah antelopes.
  - » 3. A killed *Oryx capensis* from the thin acacia woods in the same district as the foregoing fig.
  - » 4. View of the grass steppe in western Leitokitok, NW. of Kilimandjaro. In the background the lowermost slope of the mountain towards the steppe.
-



2



4



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3

Yngve Sjöstedt foto.

Ljust. Justus Cederquist, Sthlm.



PLATE 4.

**Plate 4.**

- Fig. 1. A wounded Gnu from the steppe with short grass in tufts on the vast plains between Ngare na nyuki and Ngare nairobi, the favourite haunts of Zebras, Gnus, Kongoni Antelopes, Grant-, and Thomson Gazelles.
- » 2 & 3. Views of the landscape in which the Rhinoceroses usually were found; fig. 2 a territory with dense growth of bushes; near the Hippopotamus lakes; fig. 3 steppe with scattered acacias.
4. View from the Hippopotamus lakes below Meru. These lakes form a series of longish lagoons bordered by ridges and hills covered with woods of scattered high acacias with yellow trunks, and other trees and with a dense undergrowth in which the Hippopotamuses graze during the nights and through which they have made great tunnel like paths.
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Yngve Sjöstedt foto.

Ljust. Justus Cederquist, Sthlm.



PLATE 5.

**Plate 5.**

- Fig. 1. *Crocotta kibonotensis* n. sp. (the red).  
» 2. » *panganensis* n. sp. (the grey).
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PLATE 6.

**Plate 6.**

- Fig. 1. Skull of an adult bull of *Giraffa tippelskirchi* seen from the right side to show the development of exostoses.
2. Front view of the same exhibiting the difference in the development of the exostoses on the right and left sides.
- » 3. Skull of *Rhaphicerus neumanni*.
-





**Plate 7.**

- Fig. 1. Palatal view of the skull of *Crocotta kibonotensis*.  
» 2. Palatal view of the skull of *Crocotta panganensis*.  
» 3. Skull of *Hystrix galeata umbigua*.
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